ADVISORY

DEPARTMENT OF THE IMPERIAL COLLEGE

OF TROPICAL AGRICULTURE.

IMPERIAL MYCOLOGICAL INSTITUTE
16 NOV. 1934

REPORT

ON THE

AGRICULTURAL DEPARTMENT,

ST. LUCIA,

1933.

ISSUED BY THE COMMISSIONER OF AGRICULTURE

[Price Sixpence.]

PRINTED BY THE GOVERNMENT PRINTER AT THE GOVERNMENT PRINTING OFFICE,
CASTRIES, ST. LUCIA.

1934.

FORWARDING DISEASED SPECIMENS FOR EXAMINATION.

PLANTS.

A few fragments of a diseased plant are of practically no value for scientific investigation. Sufficient materials should always be sent so that the primary cause of the trouble may be located.

Full particulars should be given as to the nature and extent of the damage *done*, the part of the plant attacked, the nature of the soil, drainage, the prevalence of the disease, when it was first noticed, and whether any similar kind of disease has previously been observed in the neighbourhood.

Specimens of portions of plants attacked by fungi may be sent green, packed in a well-ventilated box if the time taken for delivery is under 24 hours, but if delivery takes a longer time, all leaves or soft fruits should be placed in a bottle or corked tube containing a solution made of one part rum or methylated spirit, and two parts water. As many stages of the disease as possible should be sent, with notes as to the nature of each stage.

All specimens should be accompanied by detailed particulars of the nature of the disease, and shall be addressed to :—

THE AGRICULTURAL DEPARTMENT,
CASTRIES.

INSECTS.

Observations and specimens of economic importance or otherwise will always be gladly received. The following directions should be observed in this respect :—

Living insects should be packed with a supply of the plant on which they are found feeding and the box should have some small holes pierced for the purposes of ventilation. These should be carefully packed in such a way as to prevent their becoming crushed in transit.

If it is desired to preserve specimens they should be put up in bottles with tightly fitting corks. Methylated spirits, diluted rum, etc., make excellent preserving fluids.

Scale insects, etc., should be forwarded on the portion of the plant on which they are found.

If in doubt as to the best method of forwarding specimens, a letter should be sent asking for instructions and stating full details.

In all cases full particulars should be forwarded as to the nature and extent of damage done, along with any other important points that may have been noticed.

All specimens should be addressed to :—

THE AGRICULTURAL DEPARTMENT,
CASTRIES.

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LETTER OF TRANSMITTAL.

6th June, 1934.

Sir,

I have the honour to submit herewith the Annual Report of the Agricultural Department, St. Lucia for the year ended December 31st 1933.

2. The heavy rainfall during the year resulted in much damage being done to sugar, cocoa, and other crops, and considerably added to the agricultural difficulties already being experienced on account of the depression.

3. The sugar crop yields were satisfactory, but the prices obtained for sugar products continued to be low. In consequence various efforts were made to increase efficiency and to decrease the cost of production. With the permission of the Secretary of State for the Colonies the services of Mr. H. E. Box were obtained in August to initiate the work of breeding and liberating *Lixophaga diatraeae* as a means of controlling moth borer, and this work has since been continued by the estates.

4. The development of the fruit industry continued to occupy a great deal of the time of the Agricultural Officers, and satisfactory progress was achieved.

5. The propagation of citrus trees for which funds are being provided from the Colonial Development Fund was conducted on a large scale, and 8,505 budded grapefruit and 1,621 budded orange trees were distributed to estate-owners and peasants during the year. The quality of these trees was excellent. In addition, 10,082 young lime trees were distributed, of which 3,382 were budded or grafted.

6. Beetle grubs which feed on the roots of lime and grapefruit trees have recently been found to be serious pests in both St. Lucia and Dominica, and investigations to determine possible satisfactory means of controlling them are much desired.

7. The value of fresh fruits and vegetable products exported during the year amounted to £10,563. The quantities of fruit exported other than bananas showed little change when compared with the 1932 figures, and the decrease in value of fresh limes exported was offset by the increase in banana exports (from 3,149 bunches valued at £183 in 1932 to 22,258 bunches valued at £1,626 in 1933).

8. The depression in the cocoa industry continued to get more serious, and the lowest prices on record were quoted towards the end of the year. There was therefore a tendency for cocoa cultivations to be neglected.

9. A great deal of useful work has been continued at the Union Experiment Station and the results obtained at this Station are becoming of increasing interest. They are fully recorded in this Report.

10. Agricultural instruction has been continued on lines laid down some years ago and include personal visits by officers of the Department to estates and small holdings; supervision of the teaching of agriculture in the primary schools and the conducting of annual examinations in such schools and a system of training affording the opportunity for a number of young men to become agricultural cadets. An interesting development is recorded in the latter scheme whereby cadets who have passed successfully through the two years course are given a block of Crown land, properly surveyed, and free of cost in the event of their not securing employment otherwise.

11. With the anticipated extension of banana growing in the near future steps have been taken to combat the ravages of Panama disease and a definite policy of control inaugurated.

12. The Department has paid a great deal of attention to the improvement of live stock with a considerable measure of success. The request that a qualified veterinary officer should pay a visit to the Island has been acceded to and arrangements have been made for an early visits by the Manager of the Government Farm, Trinidad.

13. It is obvious from the Report that the Department as now organised is making a valuable contribution to the agricultural revival of the Colony and the officers are to be congratulated on the part they continue to play in this work.

I have &c.,

G. A. JONES.
Commissioner of Agriculture
Imperial College of Tropical Agriculture.

The Honourable,
The Acting Colonial Secretary,
St. Lucia.

STAFF OF THE AGRICULTURAL DEPARTMENT, ST. LUCIA.

E. A. Walters, F.R.H.S., F.R.M.S. —	Agricultural Superintendent & Land Officer.
A. F. Nichols, Dip. Agric. (I.C.T.A.), A.I.C.T.A.	Assistant Agricultural Superintendent and Chief Fruit Inspector.
R. W. Niles — — —	Agricultural Officer and Fruit Inspector.
G. M. Glasgow — — —	Agricultural Officer and Fruit Inspector.
E. L. Daniel — — —	Foreman, Union.
G. A. Beaubrun (1) — —	Chief Clerk and Accountant.
W. H. French (2) — —	Clerk to Agricultural Superintendent.
Miss A. Inglis (3) — —	do. do. do.
Clement Wardrope (4) — —	Foreman, Botanic Gardens.
George Hinds — — —	Plant Inspector.
W. Arthur Lewis (5) — —	Copyist.
G. S. St. Jour (6) — —	do.

Government Marketing Depot.

J. R. L. Johnson (7) — —	Manager and Fruit Inspector.
A. F. Nichols (8) — —	Manager.
Julius F. Girard — — —	Clerk and Chief Packer.

(1) From 1st January, 1933. (2) To 15th August, 1933. (3) From 16th August, 1933. (4) To 28th February, 1933. (5) To 31st August, 1933. (6) From 1st September, 1933. (7) To 30th September, 1933. (8) From 1st October, 1933.

CONTENTS.

	Page.
Work in the Botanic Gardens and Observations on Plants	1
Plant and Seed Introduction	2
Plant Propagation and Distribution	2
Notes on Plots Established at the Agricultural Station, Union ... Citrus Orchard—Grapefruit, Oranges, Limes, Intercrops and Manures. Grapefruit Orchard. Orchard Section—Mangoes, Oranges, Avocado Pears, Limes. Budded Lime Manurial Experimental Plot. Withertip Disease Experiment on Budded Limes. Coconut Plot. Sugar-cane Plot. Demonstration Orchards—Orange, Grapefruit, Avocado Pears, Mangoes, Cost and Returns. Extension Plot. Flood Damage.	4
Agricultural Cadets	14
Forest Conservation	15
Control of Insect Pests ... ... Citrus. Moth Borer Investigation.	15
Control of Fungus Diseases ... ... Citrus Diseases—Withertip and Blossom Blight and Fruit Rots; Scab Disease of Sour Orange. Cacao Diseases. Coconut Budrots. Banana Diseases.	18
Plant Quarantine ... ... Exportation of Plant Material	19
Diseases and Pests Within the Colony	21
Animal Quarantine	21
Farm Stock and Poultry ... ... Government Farm Stock Introductions under the Colonial Development Fund Grant. Poultry.	22
Examination of Agricultural Products and Soil Samples. ... ... Preparation of Lime Oils. Report on Soil Samples.	25
Progress in the Chief Industries ... ... Sugar. Cacao. Limes. Coconuts.	28
Progress in the Minor Industries ... ... Fresh Fruit and Vegetables.—Government Marketing Depot, Inspection, and Packing House Operations; Work of Marketing Officer for the Leeward and Windward Islands; Cold Storage and Ice Factory.	33
Exports from St. Lucia, 1933	36
Agricultural Outlook	37
Peasants' Development ... ... Peasants' Orchards Extension; Mango Topworking.	38
Agricultural Instruction in the Primary Schools. ... ... Report of the Agricultural Superintendent; Examiner's Report. Results of Pupil Teachers' Examination in Agriculture.	40
Administration. ... ... Report on the working of the Reunion Estate & Land Settlement. Correspondence. Expenditure and Revenue. Official Visits. Staff Changes.	45
Meteorological Observations	47

SAINT LUCIA.

Report on the Agricultural Department for the year ended December 31st, 1933.

WORK IN THE BOTANIC GARDENS, AND OBSERVATIONS ON PLANTS.

The year 1933 following two wet years was phenomenal owing to the heavy rains and floods experienced during the wet season, the highest rainfall since 1895 being recorded. Fortunately the Gardens were well protected by the concrete canal built in 1930 and so escaped serious flooding and a return to the semi-swamped condition which had been their fate periodically since their establishment.

The growth of the reclamation trees of Casuarina and Eucalyptus planted in 1932 and the year under review, has indeed been remarkable in view of the subsurface water and the saline nature of the soil which was made originally from coral mud dredging from the Harbour. The Casuarina *C. equisetifolia* well deserves its synonym of "Swamp Oak" and the value of the tree as fuel and its rapid rate of growth, apart from other aesthetic considerations, should commend this tree to those who desire to establish economical supplies of a durable timber on waste and wet lands, with a view to their reclamation and future use. The profusion of roots made by this tree results in the binding and consolidation of deposited silt and mud, thereby raising the land level, whilst allowing free drainage. The tree will grow equally well on exposed hill sides where it forms a valuable wind-break. It should not however be grown near shallow rooting crops owing to its avidity for water.

The various ornamental and economic trees and palms have survived the wet season fairly well and it is hoped that the gradual improvement now found possible will enable these collections to be saved. The Gardens as a whole have presented an improved appearance, and the lawns by being restricted to a smaller area have been better kept.

Repairs and replacements have formed a large part of the outside work, and faulty bridges, gutters, dry walls and foundations have been renovated with concrete. Oiling of the main entrances and rebuilding of the main road have considerably improved the approach to the Gardens, and this has been appreciated by casual visitors and tourists.

The necessary stock of ornamental plants, vegetable seeds and plants, and other economics was maintained during the year. The Gardens also served as a convenient centre from which to distribute the large numbers of Citrus propagated at Union for estate work.

In last year's report it was recommended that the Gardens should no longer be regarded as an adjunct to the Agricultural Department in view of the unsatisfactory site and financial difficulties preventing them from being maintained in a creditable condition as Botanic Gardens.

The suggestion that the Town Board of Castries should take over this property and utilise it for a public recreation ground or other use did not however find favour with the Board. It has therefore remained a charge on the Department, since the drainage and sanitary measures necessary are important to the health of the Town and so could not be neglected. The reclamation and raising of the sunken parts is therefore a matter of first importance and ornamental features will for the present be incidental. The work is proceeding satisfactorily and in course of time the site with its trees and open spaces, should be fit for incorporation in any extension of the Town building area for purposes of recreation.

PLANT AND SEED INTRODUCTION.

The undermentioned seeds and plants were presented to the Department and are gratefully acknowledged:—*Sesamum indicum*, Mauritius Pea, Tonca Beans, Budwood of Pink Marsh, Hybrid Lime No. 175, and Banana seedling No. I.C. 2, and "Giant Cavendish", by the Imperial College of Tropical Agriculture; variegated Hibiscus plants by the Department of Agriculture, Trinidad; Silk yams, Male Bamboo suckers and *Carica Papaya* by Mr. A. H. Green, Dominica; Bay seeds and Dancy Tangerine budwood, by the Agricultural Department, Dominica; Talipot Palm seeds and Cane plants by the Agricultural Department, Antigua; Tonca Beans by the Caribbean Training College, Trinidad; Cane plants by the Department of Agriculture, Barbados; *Spartium Brasiliensis* by the Department of Agriculture, British Guiana; and a collection of seeds by D. Landreth Seed Co., U.S.A., for trial.

Vegetable seeds were also purchased for retailing purposes.

PLANT PROPAGATION AND PLANT DISTRIBUTION.

The most important features of the nursery service this year, were the raising and distribution of the large numbers of budded citrus trees, principally Grapefruit, for which funds were provided under the Colonial Development Fund Act in 1932. Nursery land was prepared at Union Station, at Rabot Estate, Soufrière, and at Dennery, to meet the local demands for plants and also to serve as demonstration plots where potential purchasers could gain an insight into the methods of combating diseases and pests, and appreciate the points raised in demonstrations and talks on citrus growing which have been continued throughout the year.

In order to escape widespread infection of stocks at Union with Scab disease which was very destructive in 1932, beds of seedlings were raised in selected localities and the young trees when well developed, were transferred to Union for budding. By this means a much lower loss from this disease was experienced and an excellent array of stocks was brought into a condition suitable for budding by the middle of the year. Despite the influence of the wet season, Scab disease was not found to increase where plants had been grown under conditions practically free from scab, and the Dennery and Soufrière nurseries presented a very pleasing appearance of continuous ranks of robust stocks and young trees with well developed heads.

About 30,000 young stocks were used for budding work during the year, from which 25,000 trees were raised. A total of 13,547 budded citrus was distributed, leaving a few thousand trees on hand for early planting in 1934.

Of this total, 8,508 trees were grapefruit trees, representing approximately 170 acres when planted at 50 trees per acre; 1,657 Oranges, Tangerines and Lemons at 70 trees per acre representing 24 acres, and 3,382 budded Limes at 100 trees per acre representing 34 acres, together with 700 Sour Orange Stocks for inarching. This brings the increase of total new orchards in budded citrus for 1933 to approximately 230 acres.

In addition, a demand for seedling limes was met by the distribution of 6,700 plants.

The total acreage planted is not as great as it was hoped it would be, partly through the supply of plants not being available until July owing to the effects of Scab disease in 1932, and partly to the hesitation of the planter in not readily taking up the new crop as fast as trees became available. This hesitation is in part due to lack of funds, and has been met by an arrangement to supply *free* Citrus to approved small holders anxious to plant suitable lands.

With a supply of young trees already on hand and a satisfactory demand in 1934, it is hoped to establish the 1,000 acres aimed at in 1934 and 1935.

In all this distribution work it has been deemed more important to ensure that citrus trees were being planted in suitable areas and by persons likely to profit by them, than merely to swell the issue of trees by casual allocation and delivery. In consequence practically the whole of the present issue has been sent out to sites previously inspected and approved by Agricultural Officers, who have also personally supervised much of the planting.

The other chief features of the propagation work comprise an increase in the number of Coffee plants distributed for use as a crop for the local and inter-island trade; a reduction in Pineapple plants, through low prices for this crop; and an increase in cane plants mainly of new varieties propagated for the principal factories.

A further interesting development has been the free distribution of grasses and turves for the reclamation and improvement of pastures and for cut fodder, with a view to increasing the nutrient value of herbage for farm stock.

On the small planters' side, the increased supplies of vegetable plants and seeds and ground provision miscellanea is an indication that the teaching of the travelling officers is having effect, and the demand for more productive varieties of plants is an appreciation of the fact that while these may require a better form of cultivation, the net gain from them is greater.

Plants, Seeds and Cuttings distributed by the Agricultural Department during the five-year period 1929—1933.

	1929.	1930.	1931.	1932.	1933.
Lime Seedlings	19,661	14,585	7,687	13,725	6,700
Budded & grafted limes	312	2,467	296	2,019	3,382
Sour orange seedlings	...	1,110	8,405	3,200	700
Budded oranges	306	582	512	596	1,621
Budded grapefruit	235	521	1,265	1,489	8,508
Budded lemons	...	86	392	67	361
Grafted mangoes	138	116	102	69	88
Grafted avocados	256	158	123	22	40
Pineapple plants	1,253	81	5,012	1,788	942
Coffee, Robusta	55,150	1,665	7,300	140	4,690
Coconut plants	119	86	...	6	6
Dwarf coconuts	18	33	4	12	76
Claret nuts	22	14	...	11	...
Mango stocks	...	...	...	...	256
Guava	...	...	...	...	4
Sapodilla	...	...	...	...	2
Papaw plants	1,690	530	...	...	12
Total Orchard Plants	79,160	22,034	31,098	23,144	27,388
Cane plants	72	5,895	39,594	5,949	13,324
Forest plants	120	225	1,878	132	108
Vegetable seedlings	2,369	4,287	15,378	3,200	4,615
Tanias	...	...	...	...	190
Dasheen	...	...	...	...	100
Sweet Potato cuttings	...	...	5	6	14,202
Potato yams	...	...	...	3,352	4
Plantain suckers	...	...	...	141	95
Banana	...	...	...	122	140
Total Economic plants	81,721	32,441	87,953	33,046	60,166
Vegetable seeds (pkts.)	22	18	19	21	228
Green dressing seed (lb.)	248	160	119	46	5
Fodder plants & grasses	12	226	55	...	646
Pasture grasses	...	...	...	...	470
Lemon grass (stools)	...	...	...	...	600
Ornamental plants & cuttings	780	285	491	486	443
Hedge & fence sticks (bundles) ...	...	...	...	...	3

NOTES ON PLOTS ESTABLISHED AT THE AGRICULTURAL STATION, UNION.

Citrus Orchard.

Grapefruit.

The trees of the "Marsh" variety have made good growth and their shape is improving. Budwood was taken from a few selected trees only, as an arrangement was made with the managements of a few estates whereby the Department was enabled to obtain budwood from selected trees bearing fruits of desirable characteristics.

Six of the Marsh trees fruited this year, carrying from four to twelve fruits each.

The trees of the Duncan variety have also made good growth and one tree fruited.

The backward trees that were inarched with Sour orange stocks have responded well to this treatment and have made excellent growth.

The tree of the Conner's Prolific variety carried a crop of 105 fruits that were of good quality and size, 54's to 80's, but containing rather a large number of seeds.

The Foster's Pink variety continues to make rapid growth and the tree carried its first crop consisting of six fruits.

Very little pruning has been necessary in this crop, and has been conducted principally for proper shaping and removal of some barren spurs. The tree habit is that of a medium high-headed bush with branches free of the ground, and the new growths springing from the inside of the laterals, subsequently bend over to carry fruit on the outer branch-tips.

Oranges.

The trees continue to grow rapidly and all carried a good first crop, the numbers of fruit on individual trees in December varying from 75—100.

One tree of the Parson Brown variety carried about 150 fruits of good size, shape and flavour, and in consequence it has been decided to use this tree for supplying budwood for propagation.

Limes.

The West Indian budded limes have not developed as well as was expected owing to attacks of withertip and blossom-blight being unusually severe in consequence of the very heavy rainy season.

With the exception of the T.1. plants, all the Trinidad Hybrid limes have been removed and the vacancies have been filled with Pineapple and Late Valencia oranges and the back-crossed Hybrid Lime No. 178. The budwood of the Pineapple and Late Valencia oranges was obtained from Dominica and that of the Hybrid lime from Trinidad.

Intercrops and Manure.

The pineapple plants have been removed as they were making very poor growth on the heavy soil in this section, and the space was required for cover-crops and extension of the orchard trees.

Crotalaria sericea and Horse-beans proved to be effective cover crops, and the trees were mulched with lemon grass during the dry weather. In September the drains were deepened and the land was round-ridged to reduce water-logging and lower the water-table.

An application of eight pounds of a complete mixed fertiliser was applied during the year in three equal applications in January, July and December, to trees supplying budwood, and from four to six pounds to other trees according to age.

The analysis of the mixed fertiliser was as follows :—

6% Ammonia
14½% Phosphoric Acid (Water Soluble P_2O_5)
9¾% Potash K_2O.

Scale insects were controlled with a 2½% solution of Sulphemulsol.

The fruit on some of the orange and grapefruit trees were stained and badly discoloured and on examination, red citrus mites (*Tetranychus spp.*) were found on them. It seems probable that the fairly common brown markings found on similar citrus trees in the Colony is due to a combination of mite and *Thrips* damage followed by sun-scorching. It can be controlled by periodical spraying in the younger stages of fruit formation.

GRAPEFRUIT ORCHARD.

The cacao trees in this plot were removed between March and May, to make room for one and a quarter acres of selected trees of the Marsh grapefruit for future experimental work.

The land was flat-forked and divided into beds by 18″ drains placed 15′ apart, it was then round-ridged and grapefruit trees planted in alternate beds, the spacing being 30′ × 30′. The beds between the orchard rows have been planted with sour orange stocks for budding in 1934.

The orchard rows are being intercropped with black eye peas and banana seedlings I.C.2 and "Giant Cavendish" bananas obtained from Trinidad.

The plot was planted with 55 grapefruit trees, budded from three trees of the original Florida stock and carefully selected as representing the type of tree and quality of fruit desired for export conditions. These selections are called Ruby, Corinth, and Union Vale, after the estates from which budwood was obtained.

The main purpose of this plot is to establish a superior type of productive tree for supplying future budwood, and incidentally to make observations on the reaction to fertilizers.

Orchard Section.

Mangoes.

The mango trees continue to make rapid growth and they have supplied the scions for the grafted mangoes distributed. The Julie and Graham mango trees set satisfactory crops of good quality fruits, the former maintaining its superiority as a quality shipping fruit.

Oranges.

All the trees have made good growth. The four Lue Gim Gong imported as such from Porto Rico have now been determined to be Washington Navel. These trees and two Washington Navel, one Pineapple, two Temple, four Late Valencia and one Ruby variety fruited during the year. The fruit of the Washington Navel, Pineapple and Temple varieties matured in November to December, and those of the Ruby and Late Valencia in December to January. The fruit of the Ruby tree was badly disfigured with the brown discolouration already referred to and the juice had very little flavour. The fruits of the Porto Rico trees had very little juice and a good many of them dropped because of rot that started in the navel. The fruits of the other varieties were of good shape and size, but of only moderate flavour. As a whole the trees are in active growth and it is not to be expected that quality in fruit will develop much before the fourth year of growth. This has also been proved true of young grapefruit.

Avocado Pears.

One tree of the St. Anne variety and those of the Rudder and Nimlioh varieties made very poor growth. One of the St. Anne trees bore a small crop of fruit with a good flavour and shape. The Pollock tree bore a good crop of large fruit, markedly pear-shaped, with a thin skin that remained green when mature, the flesh was thick and of excellent flavour and the seed did not shake. Such a fruit would be well suited to the Bermuda hotel and tourist trade.

Limes.

The West Indian and Woglum limes made good growth and carried satisfactory crops. The Tahiti limes made fair growth and one tree fruited for the first time. Both Woglum and Tahiti limes are regarded as unsatisfactory substitutes for the West Indian lime in view of low oil content, persistent stalk, and habit of hanging on the tree until decay sets in, which occurs more rapidly than in the West Indian lime.

The orchard trees in this section received 3—5 lb. of the mixed fertilizer and also lemon grass mulch. The section was cover-cropped with *Crotalaria usaramoensis*, *Crotalaria sericea* and Horse beans. About 3,400 sour orange stocks were planted in beds between the orchard rows to be budded with grapefruit and oranges in 1934.

The Purple scale (*Lepidosaphes beckii*) was somewhat troublesome on a few plants but it was effectively controlled by spraying with 3% Sulphemulsol.

EXPLANATION OF PLATE

Figure 1. Typical West Indian Lime budded on Sour Orange stock as distributed from the Nurseries. Height including root system, 5 ft. The lower mark indicates the scion-stock union at 17 in. from soil level. The upper white mark indicates the point pruned to form the branch system.

Figure 2. Typical Marsh Seedless Grapefruit on Sour Orange stock. Height including roots, 5 ft. The lower mark indicates the bud union at 17 in. from soil level, the median mark indicates pruning point for the branch system, the upper marks indicate the points for heading back prior to distribution.

Figure 3. Root system of Estates Lime seedling approach-grafted *in situ* with Sour Orange seedling, as described under " Control of Insect Pest-Root-Borers," in this Report. In place of the deep-rooting system natural to nursery-raised trees, note the horizontal spread of roots at sub-surface level with consequent loss of anchorage. Graft-union indicated by white tracing.

Figure 4. Orchard Demonstration Plots. Specimen tree of Marsh Grapefruit, planted January 1931. Bud union at 12 in.

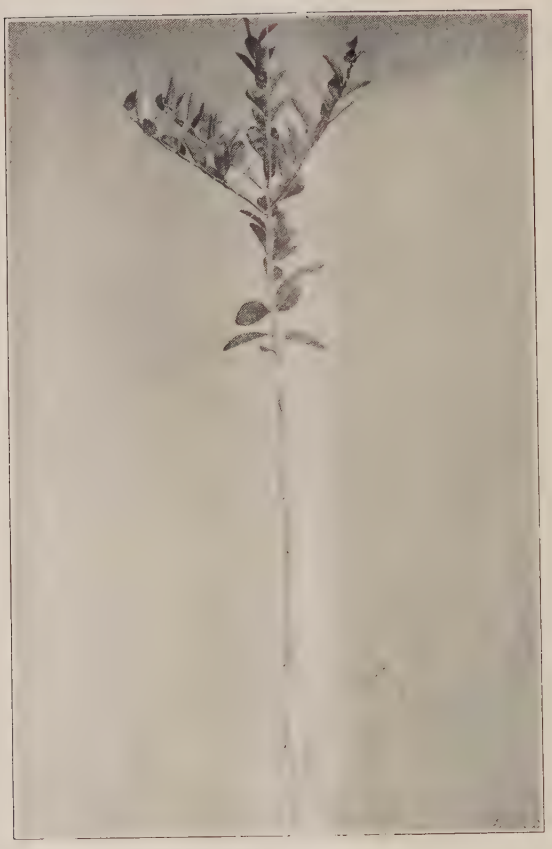


Fig. 1

Fig. 2

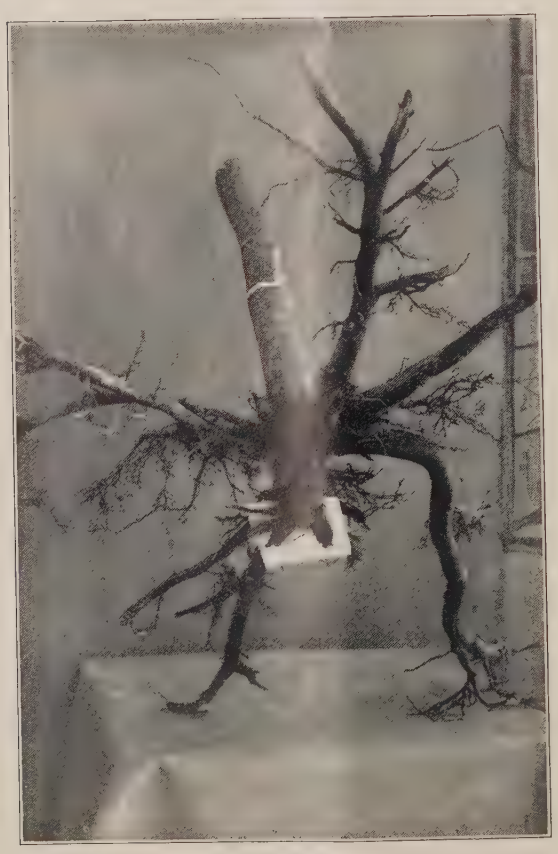


Fig. 3

Fig. 4

SEE OVER

Budded Lime Manurial Experimental Plot.

All the trees in this plot are growing well with the exception of two that have suffered badly from scale insects. This is probably due to a lack of good drainage hampering the root development and it may be necessary to replace these. About 80% of the trees flowered and set a few fruits, but apart from this the crop was insufficient to make detailed records worth while.

Trial measurements were made during the year, and arrangements were completed for a standard method of recording measurements and development of trees, to be adopted in the three citrus growing islands of Trinidad, Dominica and St. Lucia. This was proposed by the Commissioner of Agriculture, in order that the results from the different islands may be compared and analysed. The records finally decided on are as follows :—

1. *Quarterly Abstract of Expenditure on Lime Experiments.*

Costings:

(a) Cutlassing, weeding, or other weed control (mulch).
(b) Surface tilth, hoeing or forking.
(c) Draining, irrigation.
(d) Manures—(i) Cost of manures, (ii) Cost of application.
(e) Pests and Diseases.
(f) Wind-belts, and any other external features, roads, etc.
(g) (i) Supervision, (ii) Miscellaneous.
(h) (i) Reaping costs, (ii) Pruning and Tree-shaping.
(i) Cost of Plants.

2. *Measurements and Records of Tree Behaviour.*

Tree No. and date of Record.

Taken twice yearly—January and June.

(a) Spread of tree—N.E.—S.W. : S.E.—N.W.
(b) Circumference of trunk—(i) 9″ from soil level.
(ii) 21″ from soil level.
(c) Height of tree, excluding thin flushes.

As necessary.

(d) Diseases.
(e) Pests.
(f) Flowering, amount and periods in flower.
(g) Time of flushes.
(h) Manuring and mulch, kind, amount and date.
(i) General condition.
(j) Weekly rainfall.
(k) Remarks, necessary pruning, etc.
(l) Crop.
(i) Periods.
(ii) Reaping, weights and numbers, twice weekly from beneath trees.

The systematic records will be started in January 1934.

The budded citrus plants in the beds between orchard rows have all been removed and a bed of lemon grass 3 feet wide is being planted between the rows, and will be bordered on each side by a drain. The orchard rows were cover-cropped with *Crotalaria sericea* which was cut back three times during the year to provide mulch, and to prevent the cover-crop from hampering the proper development of the lime trees.

Twenty-five pounds of lemon grass mulch was applied to each tree during the month of March.

Several of the trees were attacked by snow scale and purple scale insects but these pests were controlled by spraying with $2\frac{1}{2}\%$ Sulphemulsol. All the young flushes made from July onwards were attacked by withertip, and consequently the appearance of the trees was adversely affected, but a very good recovery has been made latterly as drier weather set in.

Withertip Disease Experiment on Budded Limes.

The lime beds in this plot were forked and round-ridged and 18" drains were dug at 12½ feet apart through the beds. In October 148 plants were put in 25' × 20' apart.

This area consists of about 2½ acres divided into four plots viz :—(1) To have shade and no irrigation, (2) Shade with irrigation, (3) No shade and no irrigation, (4) No shade with irrigation.

The soil grading is not so regular as in the above plot and its texture is inclined to be stiff, with a certain amount of mottling due to prolonged absence of drainage. In consequence the land has needed a good season's weathering to bring it into condition.

Shade is to be provided by "Immortelle" trees (*Erythrina sp.*) planted 50' × 60' apart.

Coconut Plot.

The Dwarf coconuts have grown well and eleven of the twenty-five trees are fruiting and two others are flowering.

Numbers of seedlings raised from the trees were distributed during the year, and the variety is proving distinctly useful as the copra out of 4½"—3⅝" diameter at 100 nuts to the bag.

Due to the trees among the local varieties developing bud rot and wilt disease, they were destroyed. Five other trees flowered for the first time at 4 years of age and the trees generally have grown well. The land has been heavily lime-trapped with Circulorias, and with this and persistent weeding a good control has been obtained over the troublesome "Johnson grass" formerly a serious pest in this plot.

Sugar-Cane Plot.

The sugar-cane varieties have all made excellent growth in their new situation. The canes not used for propagation purposes were crushed in April and 256 gallons of syrup was made.

Variety B. 2935.

The variety B. 2935 is a new seedling sugar-cane introduced from the Coimbatore Cane-breeding Station, Barbados. It has been recommended for small scale trial plantings against Ba. 11569 in the Vieux-Fort district, where dry conditions prevail. The variety appears to remain free of gummosis bed stripping and locusts which are met with in Ba. 11569 in periods of heavy rainfall and on the wetter lands, and it may ultimately replace this variety if the present indications are confirmed.

Puerto Rican varieties of Mosaic-resistant canes.

Three of these varieties were introduced from the Agricultural Department, Antigua, during the year.

"Variety M. 42."

This variety was reported on from 7th and 8th year seedling trial plots in Puerto Rico, the crop being of 18½ months growth from autumn planted canes grown under a rainfall of 66·38" for the year 1932. Under such conditions it was stated to give a higher sucrose yield than did BH (10) 12.

"Variety M. 3."

This variety was autumn planted in Puerto Rico and grown under conditions requiring irrigation. The crop was rated at 78 tons of cane per acre, and was interesting as it produced very few arrows and showed an improvement over the parent canes from which the variety was derived.

Mosaic resistance and drought resistance are useful features of this cane.

"Variety M. 7."

This variety was noted for its vigorous stooling habit and the number of canes per stool, indicating a superiority over B.H. (10) 12 and S.C. 12/4 in these respects, particularly in areas of low yields and under drought conditions. It is immune to Mosaic disease.

Of the above newly introduced varieties, B. 2935 was in special demand and was propagated by the Java water-sucker method to facilitate easy distribution, which accordingly took place in November after release from the quarantine plots.

The following varieties were maintained in plots during the year :—

B. 4507	B. 6308	B. 374	B. 2935	P. O. J. 2714	B. H. (10) 12
B. 67	B. 409	B. 381	M. 7	P. O. J. 2727	S. C. 12 4
B. 156	B. 417	B. 726	M. 3	P. O. J. 2878	Ba. 11569
B. 208	B. 472	B. 891	M. 42	P. O. J. 2725	Co. 213

DEMONSTRATION ORCHARDS.

Plot 1, Orange.

On the whole, the growth of the trees has been excellent. Fourteen Parson Brown, twelve Temple, seven Lue Gim Gong (Navels from Porto Rico) and thirteen Late Valencia trees fruited. The Temple trees set more fruit than they could develop without adversely affecting the growth of the trees, consequently most of the fruit was removed.

Lemon grass mulch was applied to all the trees in March, and four pounds of the complete mixed fertiliser was given in two equal applications in January and July. The existing drains have been gradually deepened so as to encourage root development.

Scale insects, mites, aphides and ants have been controlled successfully by spraying with 2½% Sulphemulsol.

The plot was intercropped with plantains, bananas, yams and black eye peas. The beds are being forked and round-ridged as soon as existing crops are removed, as these are now beginning to interfere with the development of the orchard trees and proper drainage.

Plot 2, Grapefruit.

The growth of the trees in this plot has been very good, and ten Marsh and six Duncan trees fruited during the year.

The same method of cultivation was practised in this plot as in the orange plot.

Plantains, sweet potatoes and black eye peas were grown as intercrops.

Plot 3, Avocado pears.

The previous growth of the Avocados as noted in last year's report, has been followed by heavy losses in this plot. Six trees died during the year and eight others have wilted and shed their leaves, as the first symptoms of die-back. The leaves of the trees become yellow initially, and finally drop, and the tips of the branches die back, until the entire main stem dries up and dies. The roots of the affected trees have been lifted frequently and examined, and a large percentage of them have been found to be rotten and emitting a disagreeable odour. No signs of Rosellina or other active root-fungus have been found.

It is assumed that the death of the trees is due to the heavy wet season and saturated conditions in the soil, and although several deep drains have been made and great attention given to methods of cultivation, including temporary shelters, liquid manure, forking, etc., it has not been possible to induce recovery, once wilting becomes general. Most of the losses occurred at the end of the wet season or early in the subsequent dry season.

The remaining trees have made good growth and they appear to be healthy; increased attention to drainage, liming and fertilising is being given. Extra numbers of the existing varieties have been propagated in order to set out a plot on the sloping land next to the variety grapefruit plot. This is a

nearer approach to cocoa plantation conditions, under which most of the St. Lucia avocados are grown.

Three G.H., two St. Annes and two Galvana trees fruited this year. The fruits of the G.H. variety were fairly large, ripened green, had thick flesh of good flavour and a loose seed.

All the trees received 2 lb. of a complete mixed fertiliser and mulch.

A small number of tanias, bananas and plantains were grown as intercrops.

Plot 4, Mangoes.

The trees are well shaped and are growing rapidly. Twelve Julie trees fruited this year and 323 fruits were sold. The trees were mulched with grass and were pruned in November, to reduce the excessive growth formed during the wet season.

Cost and Returns.

The following schedule shows the working expenses and the income of the Demonstration Orchards from the commencement in 1931 to the end of 1933. The cultivation of the orchard trees is provided for in an annual vote of £48 until the trees come into bearing, that of raising intercrops in these plots is financed by a current Working Account, and the crops grown are sold to Government Institutions at non-competitive rates. The expenditure on the growing of intercrops was £10 3 2 and the Revenue was £16 7 5 for 1933 thus showing a credit balance of £6 4 3 on the area of four acres with some crops still to be reaped.

Plot 1, ORANGE, 1 acre (=72 trees).

Expenditure.	£ s. d.	£ s. d.	Revenue	£ s. d.	£ s. d.
1933.			1932.		
Orchard trees—			*Intercrops:*		
Tilling	4 18 10		Potato-Yams 486 lb.	1 9 5	
Draining ...	16 0		Black eye peas 25 lb.	4 2	
Upkeep	5 10 2		Yams 100 lb. ...	5 10	1 19 5
Manuring ...	1 13 8	12 18 8			
			1933.		
Intercrops.			Bananas 10 bunches	4 2	
Yams:			Plantains 35 ,,	2 15 4	
Planting ...	1 2		Black eye peas 25 lb.	4 2	
Upkeep & reaping	7 11		Pumpkins 60 lb. ...	5 0	
Potato Yams:			Yams 100 ,, ...	4 2	
Planting ...	8 11		(Potato-Yams and yams not yet reaped.)		3 12 10
Upkeep ...	12 0	1 10 0			
Expenditure ...		14 8 8	Revenue ...		5 12 3

Expenditure	(a) *Trees.* £ s. d.	(b) *Intercrop.* £ s. d.	*Revenue.*	*Intercrop.* £ s. d.
1931 ...	5 4 2	6 19 8	1931	4 11 5
1932 ...	12 11 8	10 6 8	1932	14 1 0
1933 ...	12 18 8	1 10 0	1933	5 12 3
	30 14 6	18 16 4		
			Total Revenue	24 4 8
Total Expenditure		49 10 10	Exp. to Balance	25 6 2
		49 10 10		49 10 10

Cost of Establishing 1 acre Oranges to date.

Expenditure on cultivation of trees (a) 1931-33 ...	£30	14 6
Cost of raising 72 b/d trees @ 1/-	3	12 0
	34	6 6

Unit cost per tree to date = 9/6.

Plot 2, GRAPEFRUIT, 1 acre=(72 trees).

Expenditure.	£	s.	d.	£	s.	d.
1933.						
Orchard trees—						
Tilling ...	9	13	7			
Draining ...	1	9	4			
Manuring ...	1	19	8			
Upkeep ...	3	0	5	16	3	0
Intercrops—						
Sweet Potatoes :						
Planting ...	3	3	11			
Upkeep ...		9	3			
Reaping ...		8	0			
Plantains :						
Reaping ...		2	0	4	3	2
Total Expenditure ...				£20	6	2

Revenue.	£	s.	d.	£	s.	d.
1933.						
Intercrops—						
Sweet Potatoes 1,825 lb. ...	3	15	10			
Plantain 13 bunches		17	6	4	13	4
Total Revenue ...				£4	13	4

Expenditure.	(a) *Trees.* £	s.	d.	(b) *Intercrops.* £	s.	d.
1931 ...	4	19	5	18	18	2
1932 ...	12	15	4	5	16	3
1933 ...	16	3	0	4	3	2
	£33	17	9	£28	17	7
Total Expenditure ...				£62	15	4

Revenue.	*Intercrops.* £	s.	d.
1931	10	5	8
1932	14	9	8
1933	4	13	4
Total Revenue ...	29	8	8
Exp. to Balance ...	33	6	8
	£62	15	4

Cost of Establishing 1 acre Grapefruit to date.

	£	s.	d.
Expenditure on cultivation of trees (a) 1931—1933 ...	33	17	9
Cost of raising 72 budded trees @ 1/- ...	3	12	0
	£37	9	9

Unit cost per tree to date = 10/5.

Plot 3, AVOCADO PEARS, 1 acre (=48 trees).

	£	s.	d.	£	s.	d.
1933.						
Orchard trees.—						
Tilling ...	6	5	10			
Draining ...	4	9	5			
Manuring ...		13	11			
Upkeep ...	3	17	0	15	6	2
Intercrops—						
Potato-Yams :						
Planting ...		12	9			
Upkeep ...		19	9			
Tanias :						
Reaping ...		6	0			
Plantains :						
Reaping ...		1	0	1	19	6
Total Expenditure ...				£17	5	8

	£	s.	d.	£	s.	d.
1932.						
Intercrops—						
Tanias 568 lb. ...	1	8	3			
Dasheen 303 lb. ...		11	7			
1933.						
Plantains 6 bunches ...		12	5			
Bananas 2 ,, ...			9			
(Potato-Yams not yet reaped) ...		...		2	13	0
Total Revenue				£2	13	0

Plot 3, AVOCADO PEARS.—(*Contd.*)

Expenditure.	(a) *Trees.* £ s. d.	(b) *Intercrop.* £ s. d.
1931 ...	11 1 8	3 12 1
1932 ...	12 16 2	3 5 8
1933 ...	15 6 2	1 19 6
	£39 4 0	£8 17 3
Total Expenditure ...		£48 1 3

Revenue.	*Intercrop.* £ s. d.
1931	3 10 0
1932	9 6 9
1933	2 13 0
Total Revenue ...	15 9 9
Exp. to Balance ...	32 11 6
	£48 1 3

Cost of Establishing 1 acre Avocado Pears to date.

	£ s. d.
Expenditure on cultivation of trees (a) 1931—1933 ...	39 4 0
Cost of raising 48 budded trees @ 3d.	12 0
	£39 16 0

Unit cost per tree to date = 16/7.

Plot 4, MANGOES, 1 acre (=48 trees).

	£ s. d.	£ s. d.
1933.		
Orchard trees—		
Tilling	1 18 1	
Draining	15 0	
Upkeep	1 5 4	
Picking fruit ...	1 6	3 19 11
Intercrops—		
Sweet Potatoes:		
Planting ...	1 11 0	
Upkeep ...	4 9	
Reaping ...	6 0	
Black-eye peas:		
Planting and reaping ...	8 9	2 10 6
Total Expenditure		£6 10 5

	£ s. d.	£ s. d.
1933.		
Orchard trees—		
Julie mangoes 323	1 0 2	1 0 2
Intercrops—		
Plantains 2 bunches	3 7	
Black-eye peas 20 lb.	3 4	
Sweet potatoes 1,004 lb.	2 1 9	2 8 8
Total Revenue		£3 8 10

Expenditure.	(a) *Trees.* £ s. d.	(b) *Intercrops.* £ s. d.
1931	3 0 3	7 18 8
1932	7 17 10	5 13 8
1933	3 19 11	2 10 6
	14 18 0	16 2 10
Total Expenditure		31 0 10

Revenue.	(a) *Trees.* £ s. d.	(b) *Intercrops.* £ s. d.
1931	...	1 16 4
1932	...	9 0 0
1933	1 0 2	2 8 8
	1 0 2	13 5 0
Total Revenue		14 5 2
Exp. to balance		16 15 8
		£31 0 10

Cost of Establishing 1 acre of Mangoes to date.

	£ s. d.
Expenditure on cultivation of trees (a) 1931–33	14 18 2
Cost of raising 48 grafted trees @ 1/-	2 8 0
	£17 6 2

Unit cost per tree to date = 7/3.

The total expenditure on raising intercrops was £72 14 0 for the period 1931—1933 and the total revenue derived therefrom was £82 8 1, leaving a Credit balance of £9 14 1 which was paid into the Treasury during this period.

In comparing the above unit costs per tree, it will be seen that the Mango tree ranks as the most economical crop to bring into bearing, while avocados have cost more than twice as much up to the present.

This is readily understood when the robust character of the Julie and Peach varieties are taken into consideration, particularly their freedom from serious insect depredations such as scale-insects and fruit-scarring mites, and the toleration of the root system for temporary waterlogging and deficient soil aeration.

The converse is true of avocados to an equal extent, and the high costs of raising the trees in this plot is largely due to the intolerance of the tree to lowland conditions with inadequate drainage. Special drainage has therefore been needed through the last three wet seasons, and several trees have had to be replaced, thereby increasing the net cost per tree, and reducing the area available for raising cash-crops. In summarising these accounts, the following inferences may be drawn for the benefit of those interested in tropical fruit culture :—

Cost per Acre of Establishing Budded or Grafted Fruit Trees in Neglected Cocoa Fields, including removal of old stumps and shade trees, repairing drainage and reforming throughout—

	Oranges.	*Grapefruit.*	*Avocados.*	*Mangoes.*
	£	£	£	£
Cost over three year period ...	34	37	40	17
Estimated further cost of two years to the light crop stage; add	14	15	16	7
	£48	£52	£56	£24

These gross costs are higher than necessary in view of the tree areas not being as closely grown with ground provisions as would now appear to be permissible, particularly on private estates where a greater variety of provisions can be grown and disposed of by way of payment in kind. The intercropping of the plots would also be continued by private concerns for a further two years, instead of being discontinued as at the Station in order that the trees may derive full benefit. The reduction on the above costs to meet these economies is approximately one-third. This makes the costs per acre to fruiting stage as follows :—Oranges, £32; Grapefruit, £35; Avocados, £37; Mangoes, £16.

If run entirely on the metayer system, the above costs would be materially lessened, but injury to the trees, and degrading of the soil fertility would be likely to ensue unless very careful supervision was given.

Extension Plot.

The Foster's Pink Grapefruit trees planted during 1932 have grown rapidly and two of the trees fruited this year, bearing rather large, very juicy, pink-fleshed fruit, with few seeds. The Trapp Avocado pears have also done well, and two new varieties have been added, the "Simmons" and "Butler" hybrids presented in 1932 by Dr. D. Fairchild, Botanical Explorer to the United States Bureau of Agriculture.

Five Dancy tangerines, five Barnado's pink Marsh, five King tangerines, one Barbados Cherry (*Malpighia glabra*) and one Jack fruit (*Artocarpus integrifolia*), were planted in this area.

The trees were mulched and the land was intercropped with sweet potatoes and black eye peas.

A small nursery of Gros Michel bananas was later established in this plot for nursery supplies.

Flood Damage.

On November 5th very heavy rains following on an exceptionally wet period caused the river to overflow its banks, and all the cultivated sections were covered in water, in some places to a depth of four feet. A good deal of scouring was done to exposed beds near the water courses and much top soil was removed, but no permanent trees were lost. The bare roots of trees that had suffered were recovered with soil and mulch during the two days following.

A few hundred coffee seedlings and about two hundred sour orange stocks were washed away and most of the drains on the station were blocked with soil and debris. The liability to severe damage was greatly reduced however, by the work done on the river channel which has been straightened each year, in continuance of the plan to gradually reopen the deep curves and remove the danger-spots in order to safeguard the Station.

AGRICULTURAL CADETS.

The Cadet training scheme which enables the sons of planters and peasants to undergo a course of two years free tuition in scientific agriculture and practical work, at the expense of the Colony, has been continued and is now becoming popular among the small-planter class.

During the year there were five boys in training, two second year and three first year cadets. The study courses and general arrangements were under the charge of the Assistant Superintendent, and the Agricultural Instructor assisted at examinations.

Four of the Cadets worked well and their conduct was good. One of the second year Cadets, V. Alexander, has been engaged as a nurseryman at the Station. The other Cadet did not pass his examination and final tests, and in consequence he has not been recommended by this Department for estate employment.

The curriculum was the same as that for last year except for a few minor alterations.

The second year boys accompanied the Agricultural Officers on visits to estates so as to gain an insight into estate application of the methods taught them. It is intended that the number of such visits will be increased during the coming year.

The results of the theoretical examination were satisfactory in the four cases mentioned above, the failure of the 2nd year Cadet being due to loss of interest in his work. The marks were awarded as follows :—

2nd year Cadet	...	V. Alexander	58%
2nd do.	...	C. Bisette	10%
1st do.	...	C. Laporte	65%
1st do.	...	B. Bodley	38%
1st do.	...	L. Cotter	34%

The subsequent employment of the Cadets after completing the course has become a matter of importance in order that the training given shall be put to good use. Where the Cadets have not been employed direct by the Department in the Nurseries, or in country work on estates, they have been granted an allotment of 5 acres of Crown Land, free of cost and survey fees, under conditions of supervision and development along lines approved by the Agricultural Superintendent.

FOREST CONSERVATION.

No special work was done on Forestry during the year.

The samples of timbers mentioned in the Report for 1932 under this section, as having been provided to a visitor interested in timbers from a technical standpoint, have now been reported on by a prominent firm of timber brokers in England, Messrs. Churchill & Sim of London. The following points are taken from the report :—

Owing to the slump in the timber trade, due partly to general depression, and to the manufacture of cheap substitutes, it is unlikely that any of the local timbers could be marketed with profit under existing conditions.

Many of the timbers are comparatively unknown and thus do not conform to specifications in usage in the timber trade, and the conservatism of users of timber materials discourages any new introductions unless of outstanding merit and in large suitable supplies.

American timbers imported under a 10 per cent. preferential duty, are still able to compete with smaller sources of supplies, by means of the preparative treatment given to the timber prior to export, thereby reducing freight charges.

The thanks of the Department are due to Mr. V. Dorold, representing the engineering firm of Rownson, Drew & Clydesdale, Ltd., of London, who very kindly arranged for the specimens to be prepared and placed on permanent exhibition in the Timber Section of the London Chamber of Commerce. The specimens are numbered as follows :—

1. Sapodilla	11. Fustic	21. Lignum Vitae
2. Bois Blanche	12. Bois Marbre	22. White Cedar
3. Bois Patate	13. Mammee Apple	23. Mahoe
4. Gommier	14. Balata	24. Fiddle wood
5. Star Plum	15. Logwood	25. Savonette
6. Breadfruit	16. Candlewood	26. Sea Side Grape
7. Laurier	17. Calabash	27. Breadfruit, wild
8. Satin Wood	18. Cashew	28. Bois Blanc
9. Laurie l'eau	19. Red cedar	29. Inga Vera
10. Bois Rouge	20. Bay tree	30. Mapou.

The exports of forest produce again attained a high value compared with earlier years, and amounted to £5,409 in value of mixed products, in which charcoal exports were conspicuous at 85,840 bags valued at £4,327, as against 79,960 bags valued at £4,042 in 1932. The amount of charcoal exported for the year when calculated at 250 bags per acre is equal to 343 acres of cleared woodland, this acreage is in marked excess of the average annual clearing for charcoal, which is approximately 180 acres per annum. There is reason to believe that a considerable proportion of this increase is derived from 'squatters' clearings, and action has been taken to regulate this unauthorised acquisition of Crown Lands, and to restrict such clearings to localities suitable for the production of crops, in order to bring about permanent agricultural settlement.

Revenue derived from the present charcoal tax amounted to £715 for the year 1933.

CONTROL OF INSECT PESTS.

The most important work carried on during the year on insect pests of crops was the control of scale insects and of root borers in citrus plantations and the special programme of Sugar-cane Moth-borer investigations undertaken by Mr. H. E. Box, F.R.E.S., Entomologist in charge of field work on Moth Borers of sugar-cane in the Leeward Islands.

CITRUS.

Scale Insects. The principal scale-insect affecting Citrus has been the purple scale, *Lepidosaphes beckii*, on young grapefruit and orange plants in the orchards. This pest is regarded as symptomatic of poor health of the trees and is usually followed by defoliation and die-back of twigs and branches unless measures to check this are introduced early. These fall under two heads, (1) ample and effective drainage and prevention of water-logging by lifting and replanting the young trees on mounds, so that the soil-mark is well above soil level and the crown roots are able to dry off in wet weather; and (2) removal of scale incrustations by washing and brushing with a contact insecticide. The cheapest and most effective insecticide is Sulphemulsol, a byproduct of the Trinidad petroleum industry, introduced to agriculture through the Imperial College of Tropical Agriculture. This product needs only dilution to the requisite proportions and involves no skilled handling; it is available from local supplies at 1/4*d*. per gallon and should be diluted to 2 or 3 per cent. for controlling scale insects and similar pests.

Where trees failed to respond to this treatment, it has been necessary to determine whether the root-system has been destroyed by waterlogging or boring insects, and specimens have been examined showing extensive wet-rot of the primary roots. Such trees have been removed and replaced by strong trees on well-drained mounds; in particular has this been necessary in the alluvial flats where the soil texture is heavy and prevents the free movement of soil water. Inarching has also been successful.

Citrus leaf mite.

This insect, a minute white mite, has periodically infested young trees growing as stocks in the orchards, causing distortion and 'blinding' of the leading shoots. It is controlled by removal of the twisted foliage, and a thorough drenching with 1 to 2% Sulphemulsol.

Fruit Staining

The discolouration of citrus fruit has been prominent on lowland grapefruit and oranges and has prevented their sale other than locally. It is recognised as a darkening and staining of the rind which takes on a dry and polished appearance. The casual agent is the citrus rust mite, generally in co-operation with scale insects, and these pests are responsible for the tear streaking and ring blotching of fruit with which most growers are now familiar. Control by spraying very young fruit, and by subsequent periodical sprays with Sulphemulsol is recommended.

Root borers.

Extensive depredations by root borers caused serious losses of bearing limes and some grapefruit trees of the original Florida stock in the bottom meadow lands of an estate on the Windward coast. Similar losses are believed to be present in several new plantings of grapefruit and the following description is therefore given in this connection:—

The lime trees were raised from seed, sown at stake, and were inarched *in situ* with sour orange seedlings grown alongside. High mounds of soil were built up to form seed beds and were surrounded with live Gliricidia as shade to retain the soil and collections of shade prunings and litter. The unusual conditions under which the trees were grown resulted in a pan formation, and the root system was confined to the horizontal layer immediately below the surface, no tertiary or lateral roots being present.

The initial growth of the trees following inarching at 2 years was excellent, but was succeeded by a decrease in growth and crop increment, and finally by loss of foliage and drying-out of the trees.

Excavated trees shewed breakdown of the tap root and some secondary roots, and a large number of white borers was found in the roots and in the surrounding soil. The larval stage only has so far been obtained with collected and cage specimens, and from this the borer appears to be similar to the Jamaican *Prepodes* and *Pachnaeus* or 'fiddler' beetles. The grubs feed extensively along the bark of the larger roots lying just below the surface of the ground and around the collar, thereby disconnecting areas of food-conducting tissue, which consequently affects the development of the trees and results in cessation of growth and shedding of foliage and any crop. Exposure of the woody interior of the roots thus attacked, further results in decay and loss of the main roots and internal infection of the phloem, and is likely to result in gumming and loss of the tree.

The use of paradichlor-benzene as a soil fumigant to be buried in holes around the affected trees has been recommended by the College Advisory Department and a supply of the fumigant has been imported.

Leaf melanose.

This condition is seen in the foliage principally of grapefruit and oranges at low altitudes, and is recognised by the formation of black grease-like exudations firmly attached to both surfaces of the leaves, and to some extent on the fruit and branchlets. Through the courtesy of Mr. R. S. Woglum, Entomologist, of the California Fruit Growers Exchange, the opinion of Dr. Fawcett an authority on citrus, was obtained. The condition was described as black melanose or 'greasy spot' as stated in last year's report, and is a physiological disturbance of the tree due possibly to malnutrition. The condition is common in Southern Florida and the West Indies. In the case of trees in lowland areas, attention to drainage and subsequent manuring is recommended.

Moth-borer Investigation.

Following a petition to the Secretary of State for the Colonies from the sugar interests of St. Lucia and a resolution passed by the Agricultural and Commercial Society in August, 1933, the services of Mr. H. E. Box, Entomologist of the Colonial Development Fund, then working on Moth-borer control in Antigua, were obtained to take up the investigation of *Diatraea* losses in St. Lucia. The preliminary work of the local Agricultural Department since 1930 had shown that a serious loss amounting to twenty per cent. of the sugar output of the factories was caused by destructive ravages of moth-borers.

This work was accordingly taken up by Mr. Box, and the Factories jointly provided a fund to meet the expenses of the visits and provide equipment for the purposes of the investigation. Mr. René Dulieu acted as assistant in this work and subsequently was responsible for the continuation of breeding and release of the parasitic flies, *Lixophaga Diatraea* Townsend. The total number of parasites thus released during the year was 2,390 for the four factories, *pro rata* the contributions made to the fund.

The full account of this work has been published in St. Lucia and is entitled "Further Observations on Sugar-Cane Moth Borers (Diatraea spp.) in St. Lucia", by Harold E. Box, F.R.E.S.

The work of making an estimation of field losses due to borers was again undertaken by the Assistant Superintendent, and counts were made at the fields of two estates on losses from infestations by *Diatraea saccharalis*, the small, black-headed cane borer, and of the yellow-headed borer *D. canella*, which has been recognised by the Entomologist as an important contributor to the losses from bored canes.

The method employed was the same as that used during the 1932 reaping season, except that 500 canes were examined from each area instead of 200 as in 1932.

Loss from Moth-Borer Infestation and Rat Damage in Four Fields (February,—March.) Crop 1933.

Crop.	Field Loss %		Factory Loss %	Total Loss % Crop.
	Rat Damage	Moth Borer		
Field 1 Plant canes BH 10 (12) ...	3.3	14.2	4.3	21.8
Field 2 ,, ,, ,, ...	3.3	19.5	4.6	27.4
Field 3 ,, ,, ,, ...	3.3	16.9	1.6	22.4
Field 4 1st ratoon ,, ...	3.2	11.4	1.8	16.4
Average 1933=	3.27	15.50	3.07	
,, 1932=	2.36	12.24	2.42	

	1932	1933
Average Borer loss in Plant Canes ...	18.2%	20.3%
Average Joint infestation in Plant Canes ...	14.1%	17.4%

The above returns show a marked increase in the previous year's infestation, this is to some extent a seasonal factor. Rat damage was higher, possibly owing to the increased number of canes thrown down during the wet growing season of 1932.

It is anticipated that the important work briefly described above will be continued for a further period, in cooperation with the Imperial College of Tropical Agriculture.

CONTROL OF FUNGUS DISEASES.

CITRUS DISEASES.

Withertip and Blossom Blight, and Fruit Rots.

Owing to the absence of any well defined dry season following the wet weather of the previous year, Blossom-blight of limes was sufficiently prevalent to affect the crop rather seriously. The fruit also suffered to some extent from stylar-end rot during the wet season.

Green limes were found to break down in prolonged storage owing to rind bruising and to picking whilst wet. Careful quailing immediately after picking for a period of 1 to 2 days to reduce the water content of the rind and to render the rind tough so as to permit handling, is very necessary if the fruit is to be packed for export. Infections of rind bruises is retarded and satisfactorily overcome for export purposes, by cool-storing fruit at 45° to 50° F.

Scab Disease of Sour Orange.

The disappearance of private nurseries for budding which in most cases have been shown to result in unsatisfactory trees, has also reduced the prevalence of scab disease, and little trouble was experienced from this source during the year.

As reported under 'Plant Propagation' the raising of nursery seedlings on new land and in drier localities, has practically eliminated the fear of severe scab attacks, and a careful plucking and burning of slight infections has kept this disease under control.

Cacao Diseases.

The condition of the cacao markets for the past few years has not encouraged planters to spend money on attempting to control such a persistent root disease as *Rosellinia* and where affected fields have been partially abandoned, the extension of this destructive disease has been rapid. Some of these fields have been replanted in cacao, with the hope of reaping a few crops before the disease reappears in the new trees, but more often have the fields been replanted with limes, grapefruit, or coconuts.

There is no well authenticated case of *Rosellinia* invading the uninjured roots of the Sour orange in St. Lucia but it is known to occur on wounded roots. For this reason every care should be taken to prevent collar wounds when cutlassing in the citrus orchards.

Coconut Budrots.

Twenty-five cases of budrot of coconuts were treated during the year, and a careful watch has been maintained to prevent the use of infected seed nuts. Under the conditions existing during the last rainy season, coconuts in badly drained flats and on impervious soils have been in danger of prolonged water-logging and budrot. Better drainage methods are being urged, and the use of wood-ash from plantations refuse is recommended as a substitute for artificial fertilizers which are at present uneconomic.

Banana Diseases.

The revival of interest in banana growing due to the export of bananas to Canada, has drawn attention to the need for education in restricting the spread of Panama disease and the selection of disease-free material for planting.

Treatment of Panama disease has consisted of firing and chopping down diseased stools, and more recently in the use of Gas Oil by pouring this over the cut back stems of diseased bananas. Such oiled stools usually die in the course of about two weeks, and thus the risk of infection by digging out and handling diseased stools and soil is removed. The cost of treating such stools is approximately 3*d*. each including labour and material, and with infection widely distributed in the lower agricultural lands this is found to be prohibitively high. The plan of campaign has been to concentrate on the disease in the banana areas adjacent to forest land, and by working outwards to treat all disease cases encountered until a wide barrier separates the new hill plantings from the infected lower areas. In these areas the transport of Gros Michel planting material is prohibited.

The extension of supplies of uninfected planting material to peasants is to be organised from the four banana nurseries which are being opened up in the Mahaut Valley, Murray Road, Barre de L'isle and Dennery Valley areas. In the meantime every assistance in locating and preparing healthy planting material for use in uninfested areas is being given to those interested in this development.

PLANT QUARANTINE.

The introduction of all plant material is regulated under the Plants Protection Ordinance No. 14 of 1916 (revised), and cognate subordinate legislation. This quarantine work involves the inspection of all seeds, plants, and miscellaneous planting material and containers introduced into the Colony during the year, and is carried on in conjunction with the Post Office and Customs authorities. The introduction of soil, fruit and vegetables is further regulated by legislation under the Customs Amendment Ordinance No. 2 of 1920.

The inspection of material thus introduced was carefully carried out and fifty major introductions were dealt with. Interceptions of viable corn and coconuts and of diseased citrus fruits and soil were the principal features.

The following schedule gives the position of legislation regulating the importation of material likely to be a means of introducing diseases or pests :

A. *Prohibited articles, including seeds, plants, soil, and packages and articles connected therewith.*

Articles Prohibited.	Country of Origin.	Reasons for Prohibition.	Index of Legislation.
Plants and Seeds.	Ceylon.	General precautions.	Revised Rules Chapter 7 Regulation 2.
Cacao plants or any parts thereof.	South America, South and East of Panama.	Witchbroom disease.	Revised Rules Chapter 7 Regulation 2.
Banana plants or any parts thereof.	Trinidad, Tobago, Central and South America.	Panama disease, root disease and insect pests.	Revised Rules Chapter 7 Regulation 2.
Banana plants or any parts thereof.	Jamaica.	Panama disease, root disease and insect pests.	Proclamation of 8.9.17
Banana plants or any parts thereof.	Grenada.	Panama disease, root disease and insect pests.	Proclamation No. 6 of 1925.
Banana plants or any parts thereof.	Canary Islands and West Africa.	Panama disease, root disease and insect pests.	Proclamation No. 13 of 1925.
Coffee, guava, mango, sapodilla, starapple, plants, fruits, etc.	Bahamas, Ceylon, Cuba, Jamaica, India, Philippines.	Citrus Black Fly.	Proclamation of 10.2.17
All soil, fruit & vegetables, except plantains, nuts, onions, Irish potatoes, canned, dried, and processed fruit and vegetables.	Countries other than the British Isles, Canada, and British West Indies.	Mediterranean Fruit Fly.	Customs Amendment Ordinance No. 2 of 1920—Notice No. 7 of 1930.

B. *Prohibited articles except under licence and specified provisions.*

Articles Prohibited.	Country of Origin.	Reasons for Prohibition.	Index of Legislation.
Sugar cane, corn, sorghum, fodder, grasses, and seeds of grasses. (Natural Order—Graminae).	Any place beyond the limits of the Colony.	Mosaic disease of cane.	Proclamation No. 6 of 1921.
Coconuts, coconut plants, or any parts thereof.	From any place.	Red Ring disease, other diseases.	Proclamation No. 2 of 1924.
Cotton seed, seed cotton.	From any place.	Pink Bollworm, other pests or diseases.	Proclamation No. 3 of 1924.
Citrus plants, fruits, and any parts thereof.	From any place.	Citrus Canker, citrus black fly, and general precautions.	Proclamation No. 3 of 1927.

C. *Permitted articles, provided these have passed inspection by the Agricultural Department, or are otherwise authorised to be imported.*

Articles Permitted.	Country of origin.	Index of Legislation.
Garden seeds, not including corn, grasses, etc.	From any place.	Plants Protection Ordinance No. 14 (1916 Revision.)
Plants, root-stocks, nuts, tubers, bulbs, cuttings, etc., free from soil and not, included under "A" & "B".		

The introduction of planting material of the more important crop plants has now been arranged to take place through the Central Quarantine Station established in Trinidad.

Exportation of Plant Material.

Certificates have been drawn up to meet the requirements of Departments of Agriculture in overseas countries and of the Ministry of Agriculture and Fisheries for England, Wales and Scotland. These are necessary in any exportation of local plant material.

DISEASES AND PESTS WITHIN THE COLONY.

The existence of the following diseases and pests should be notified to the Agricultural Department in order to comply with the requirements of the Plants Protection Ordinance :—

Coconuts—Budrot of coconuts.

Sugar-Cane—Gumming disease of sugar-cane.

Bananas—Panama disease, marasmius disease, banana weevil and borer.

Cotton—Pink bollworm of cotton.

The presence of the parasites "love vine" and "bird vine" should also be reported.

ANIMAL QUARANTINE.

The introduction of farm animals, fodder and litter is regulated by Ordinance No. 17 Diseases of Animals, under which the Governor in Council may prohibit any importation likely to be a means of introducing disease. Visits and inspections entailed by this work are carried out by the Agricultural Superintendent in collaboration with the Senior Medical Officer.

The following legislation is in force to regulate the importation of animals and farm products :—

Prohibition.	Country of origin.	Reasons for Prohibition.	Index of Legislation.
Animals, not including dogs. Horses excluded by special permission. Importation allowed on production of certificate of freedom from Anthrax.	St. Vincent, Grenadines, British Guiana, Venezula, St. Kitts & Nevis.	Anthrax.	Notice of 16.6.17, No. 7 & No. 8 of 1918, No. 9 of 1919, No. 6 of 1930.
Animals, fodder & litter until further notice.	England, Scotland, Wales, Ireland, Isle of Man, Channel Islands.	Foot & mouth disease.	No. 103 of 2.5.24.
Animals—except with Veterinary Certificate approved by the Agricultural Superintendent.	Trinidad.	Rabies.	Regulation No. 4 of 1933 under Public Health Ordinance, No. 19 of 1931.
Birds of the parrot family or subtribe *Psittacideae* except under licence.	From any place.	Psitticosis.	Customs Amendment Ordinance No. 2 of 1920, Notice No. 8 of 1930.
Queen Bees, or used bee apparatus, except under licence.	From any place.	Foul brood disease.	Ordinance No. 18 of 1916 Revision & No. 13 of 1928.

FARM STOCK AND POULTRY.

Sheep.

The year 1933 was a difficult period for local sheepowners owing to the continued wet weather and cool winds, and considerable losses were experienced in the flocks from anaemia and debility following parasitic infestations.

The presence of Strongylus worms (*S. Contortus*) in the Persian Blackhead Ram, caused severe gastro-enteritis and dropsical conditions in the body cavity. The ram did not respond to treatment with worm specifics and careful dieting, and died suddenly. The ewe was examined with negative results, she was also treated for Strongylus and was then pastured on a hill estate under close supervision. She also died, but in the absence of a post-mortem examination, the exact cause was not determined.

The Veterinary Surgeon of the Government Stock Farm Trinidad, who kindly advised the Department on specifics, has recommended the monthly dosing of sheep infested with Strongylus with a solution of 10 grains copper sulphate in 8 ounces water before feeding.

Infestation of flocks on exposed lowland pastures in the area of minimum rainfall was reported to be causing heavy losses. Specimens of the infected organs when examined, have been found to be heavily infested with Strongyloids (*Triodontophorus*). The flock also suffered from mange.

The above recommendation as to specifics, and the segregation of young lambs and of infected sheep from the rest of the flock for treatment, together

with the removal of the flock periodically for penning in clean pastures, with adequate water supply, are measures which have been further advised to owners who have to deal with this disease. It is hoped however that a personal visit by the Veterinary Officer can be arranged in the near future, in order to advise on the conditions under which the animal stock of the Colony may be kept free from serious diseases and the milk and meat supply of the Colony safeguarded. It is now many years since a practical survey by a specialist in animal industry has been made here and such a visit should be delayed no longer, as the introduction of valuable stock and the grading up of animals is likely to be indefinitely delayed if disease conditions become general.

The African woolless sheep imported some years ago have intercrossed with wool breeds locally and there has been evolved a hybrid race of partly woolled sheep which does well on the scanty pasture of the drier coastal slopes. The lambing season occurs twice annually, in September—October and in January—March, although lambs are also dropped throughout the year. The meat is inclined to be stringy and needs improvement in weight and flavour. The breed is however very resistent to disease, and requires no concentrates to maintain a healthy condition. For this reason it would appear to be a suitable breed for improving by selection and grading up, and for crossing with introduced mutton breeds which are too delicate to exist as pure breeds under local condition. The keeping of sheep is becoming an important factor in weed control and manuring of the coconut plantations, and for general agricultural purposes also sheep manure is in constant demand.

Cattle.

It cannot be said that there is much likelihood of the cattle industry becoming important in St. Lucia in view of the neighbouring supplies of meat and live animals. There is however a very good opening for experienced farmers in endeavouring to capture the meat, butter, cheese and milk supplies annually imported for domestic use.

The chief articles of animal produce, of which a large proportion could be raised locally are as follows :—

	Quantity.	Value. £	*s.*	*d.*	
Cattle No.	4	62	0	0	
Butter lb.	41,061	2,653	0	0	
Cheese „	11,722	509	0	0	
Milk „	2,195	102	0	0	
Meats—					
Canned, lb.	5,120	182	0	0	
Cured, Saltedlb.	52,650	1,397	0	0	£4,905

Of these imports, valued at £4,905, only a small proportion is re-exported as ship stores, and the great proportion is consumed locally. Much of this could be produced on local pastures and placed in cold storage to await convenient market conditions and a steady demand. It is not enough however to work the common native cattle, and at senility to convert them into meat. Work animals which are to be used subsequently as meat should have a sufficient ration of concentrates in addition to ample good pasture or fodder grasses. It would seem that a quick growing breed such as the Hereford which matures early would be valuable purely as a young beef animal, and that the heavy, sturdy Sussex breed which matures at three years would be suitable as a work animal and for use subsequently as beef. The quality of local beef is poor and the supply is uncertain.

The importation of a pedigree Beef Bull of the Sussex breed was under consideration by Government during the year, but the matter was postponed through lack of funds and the need for further veterinary advice on disease conditions before any extension of the breeding work should be undertaken.

GOVERNMENT FARM STOCK INTRODUCTION UNDER THE COLONIAL DEVELOPMENT FUND GRANT.

During the year there was a regular demand for the services of the pure bred Holstein-Freisian Bull "Gerald II" and for the ¾ Holstein-Zebu Bull "Arneaud", a good proportion of these services being on account of small holders.

The number of services recorded and the progeny known to have been born is as follows:—

	Period.	No. of Services.	Calves Reported.*
Gerald II.	1932 May—December.	21	bulls 4, heifers 5
	1933 January—November.	32	,, 3, ,, 2
		53	bulls, 7 heifers 7
Arneaud	1933 April—November.	13	bulls 3, heifers 1

* This record is incomplete owing to owners not reporting the results of services and to some services for 1933 not yet due to report.

It has been further ascertained that of the nine calves born in 1932, three died as a result of exposure and debility due to the cows getting into poor condition. It is being brought to the notice of those concerned that the progeny of these crosses require more careful attention than is frequently given to calves and that early exposure is to be avoided. An effort is being made to induce more ready use of suitable concentrates such as corn meal and farine gruel, with molasses, to supplement the milk, and to delay the introduction to early pasturage which has occasioned losses of calves.

Such calves as have been inspected are well-formed, big-boned animals, generally in vigorous condition, and are of a dark colour and Holstein appearance generally.

The use of tick-wash has been extended by the introduction and free distribution of washes specially compounded to meet local requirements. There is still much to be done in this direction however, as few owners recognise the early attacks of ticks and delay treatment until a conspicuous degree of infestation is reached, with consequent loss in vitality of the animals. This has occurred with the stud bulls when on tour.

Pigs.

The following services have been made to local piggeries mainly on behalf of peasant owners, with whom a certain amount of selection and breeding out of scrub types of pigs has been necessary before services have been given.

	Period.	No. of Services.	Progeny Recorded.*
Large Black-Boar	No. 1 August—December	6	3 litters = 11 boars, 4 sows
,, ,, ,,	No. 2 ,, ,,	9	6 ,, = 30 ,, 15 ,,
		15	9 ,, = 41 ,, 19 ,,

* Records not complete.

Of the above progeny, 2 litters of 4 piglings (L. Black x Berkshire) and 9 piglings (L. Black + L. Black) were Station-raised litters from the pure breeds. There were three losses from still-birth and overlying. For the prevention of the latter a wooden grid in the form of a sloping open framework of wood placed against the walls, and through which the young can escape when the sows are resting, has been adopted and is recommended to keepers of penned animals.

One pair of pure-bred Berkshire pigs was added to the farm during the year, and the sow raised one litter as above in March of the present year.

All the pigs were treated with castor oil and Chenopodium for the removal of worm parasites, with negative results. Rheumatism was treated by fomentation, embrocatives and massaging.

The grading up of pigs is appreciated by the small holder to whom these animals represent a minor source of income and food. There are estimated to be approximately 8,000 pigs of various breeds and grades in the Colony, the majority being owned by small holders. Of this number one-half are still of the bush pig type with lean flanks and razor backs, although these animals are being steadily replaced by the improved grades.

Poultry.

Much interest continues to be taken in the introduction of pure-bred poultry, mainly at the stage of day-old chicks which are imported by airmail.

The principal breeds introduced up to the present are the Brahma, Rhode Island Red, Jersey Black Giant, Cornish Game, Barred Plymouth Rock, Wyandottes, White Leghorn, Black Leghorn, Sussex, Orpingtons and Australorps, a total of 1,475 chicks being thus imported during 1933.

The White Leghorn breed is maintaining its reputation as a layer, and the Barred Rock is also a satisfactory breed for general use.

The Jersey Black Giant appears to suffer from tumour formation in the wet season, and this breed and the Rhode Island Red poultry both need careful and quiet handling, as owing to their large size and heavy weight, the birds are liable to falls and injury when excited.

Crosses of the various breeds with the local small type of bird have been freely made and the progeny are much superior in character to the native fowl. When mated with a pure-bred cock the bush-fowl characteristics become recessive to the dominant factors of the cock, and well-formed birds of breed colour are predominant. These should be preserved for further breeding, while the small, nondescript chicks of the wild type of which there are usually one or two in a hatching, should be utilised for food.

The quality of cooking fowls has therefore been improved in a short time, and better eggs are now available. The supply however remains short and imported eggs are still being used for stores.

EXAMINATION OF AGRICULTURAL PRODUCTS AND SOIL SAMPLES.

Preparation of Lime Oils.

In the report under this head for 1932, it was recommended that owing to complaints on the variability of lime oils, certain precautions should be taken in the future in order to eliminate inferior quality oils likely to damage this trade. The following manufacturing technique was recommended by the Advisory Department of Agriculture, Imperial College of Tropical Agriculture :—

1. The use of sound, ripe limes only.
2. The removal by straining, of coarse pulp and seeds; straining should take place as soon as possible, to prevent fermentation.
3. The use of clean containers, and of a clean still which should be washed after each distillation.
4. Slow and even distillation; the rejection of the last 8—10% of the charge, which, if sold, should be bottled and labelled separately.
5. Handpressed and distilled oils should be bottled separately, and kept in the dark in tightly corked containers.

The more important producers have accordingly adjusted their procedure to meet these requirements, and parcels of the various oils have been marketed.

Up to the present there has been no differentiation by the markets on the first quality and presumably lower qualities of oils made by this method, and these have all been accepted without complaint. The fact remains, however,

that non-adoption of the requisite care in manufacture may occasion definitely inferior oils to be produced when conditions are favourable to this, and it is strongly recommended that the above procedure should continue and be fully adopted as the standard technique. The inferior oils have been recognised as darker in colour, but without defective odour.

At least one of the stills working under the earlier method has recently been found to produce inferior oils, and as the improved method is necessarily the safest one, and in view of a weaker market generally for these products, the wisest course is to safeguard this valuable trade by meticulous care in the manufacture of lime oils.

Inspection by sampling and sealing of 26 cans of lime oils was carried out for local lime oil distillers, and certificates were provided for exportation. This work is done at a minimum charge and enables any individual can to be traced from the duplicate sample, and any complaints thereon to be investigated.

Testing of concentrated lime juice was also carried out for the export trade.

Report on Soil Samples.

The co-operation of the Advisory Department of Agriculture enabled a series of soil profile samples to be taken and reported on by Professor F. Hardy and Mr. J. A. MacDonald, of the Department of Soil Science, Imperial College of Tropical Agriculture, during a short visit here in April. The samples (A) and (B) were interesting as representing definite crop conditions unchanged for a considerable period, and compare the composition and fertility of (A), soils under sugar-cane, (B), soils of very fertile cacao fields, and (C), soils of the Experiment Station now being brought back to good condition. The more general features of the report are included below :—

(A) Valley flats in cane, 3rd ratoon.

Indications of soil Profile.	Depth in ins.	Index of Texture.	Normal Reaction pH.	Organic Matter. %	Nitrogen %	Carbon Nitrogen ratio	Available nutrients mhos.	Rate of Solution.	Available phosphoric acid (P_2O_5) parts per Million.	Available Potash K_2O p.p.m.
1. Sepia ...	6	37	6.3	2.34	0.22	6.3	92	243	112	116
2. Ditto ...	12	35	6.7	1.53	0.16	5.5	58	48	47	133
3. Speckled ...	18	40	7.0	0.85	0.11	4.4	60	32	16	...
4. Mottled ...	24	41	7.3	0.41	0.06	3.7	71	34	8	...
5. Speckled ...	36	39	7.2	0.33	0 04	4.5	62	12	9	...
6. Ditto ...	48	34	7.1	0.29	0.03	5.0	38	24	20	...
7. Ditto ...	54	25	7.0	0.23	0.03	5.0	35	15	31	...

Notes.—(1) *Texture.* The soil varies from a silty loam in the surface foot to silt between 1 and 3 ft. levels to sandy loam at base. The profile thus shows accumulations of finer particles below the first foot level.

(2) *Reaction.* A gradient similar to that for texture is evident. The top soil (first foot) is slightly acidic, but the lower horizons are neutral or slightly alkaline.

(3) *Organic Matter.* This is medium-high in amount and shows fairly deep penetration.

(4) *Carbon/Nitrogen Ratio.* The values are quite normal for good sugar-cane soils, but their significance is not yet understood. The subject is receiving special study.

(5) *Nutrients.* The values are medium-high. Rate of solution, available phosphate and available potash are all above the limits for deficiency (24 p.p.m. for phosphate, and 100 p.p.m. for potash).

The soil would therefore be classed as one of medium high to high fertility, and, provided the water relations are satisfactory, it would probably be uneconomical to apply manures.

(B) Hill land in Cacao, shallow profile, representing a high yielding field.

Indications of soil profile.	Depth in ins.	Index of Texture.	Normal Reaction pH.	Organic Matter %	Nitrogen %	Carbon Nitrogen ratio.	Available nutrients mhos.	Rate of Solution.	Available phosphoric acid (P_2O_5) parts per million.	Available Potash K_2O p.p.m.
UV1. Humic ...	1½	11	7.0	2.68	0.13	8.9	155	62	122	...
2. ,, ...	3	12	6.9	2.28	0.15	8.6	122	52	109	185
3. ,, ...	6	9	6.8	1.54	0.11	7.9	61	77	118	...
4. ,, ...	12	10	6.8	1.37	0.09	7.3	36	33	94	...

NOTE.—This is a light sandy soil, whose characters agree very well with our conception of a good cacao soil as set out in our recent reports on cacao soils of Tobago, Grenada and Trinidad (Gran Couva district). Note the high Carbon/Nitrogen Ratio (which seems to characterise highly-productive cacao soils in the West Indies) the very high Available Phosphate values, and the high Available Potash contents, showing excellent nutrient status.

(C) Union Experiment Station.

Surface soil samples from Manurial Lime Experimental Plot. Each sample is a *Composite* of ten soil cores from each plot sampled. *(For the sake of brevity the upper and lower limits only of the indications are included in this analysis taken from the report)* :—

	Depth in ins.	Index of Texture.	Normal Reaction pH.	Organic matter %	Nitrogen %	Carbon Nitrogen ratio.	Available nutrients mhos.	Rate o. Solution.	Available Phosphoric acid (P_2O_5) parts per million.	Available Potash K_2O p.p.m.
	6	46	6.6	1.54	0.14	6.3	59	25	9	62
Lower Limits	12	46	6.6	1.13	0.12	4.4	55	32	7	...
	24	42	6.8	0.60	0.07	5.0	48	16	6	...
	6	52	7.0	2.14	0.17	7.9	84	114	18	88
Upper Limits	12	52	7.1	1.76	0.16	8.6	94	59	11	...
	24	52	7.6	1.06	0.10	6.4	65	55	37	...

NOTES.—(1) *Texture.* The Index of Texture values show that the soil is a clay-soil throughout.

(2) *Reaction.* This fluctuates around neutrality (pH 7.0), and tends to be slightly acidic, especially in the surface 6-inch layers.

(3) *Organic Matter.* This is medium-low in amount, and penetration is good.

(4) *Carbon/Nitrogen Ratio.* This would be considered low for cacao soil. Its significance for citrus soils is not known.

(5) *Nutrients.* Available Nutrients and Rate of Solution are medium-high. Available Phosphate is *very low* (limit of adequacy for sugar-cane, 33 to 24 p.p.m.). Available Potash is also low (Limit, 120 to 90 p.p.m.).

The soil would be classed as one of medium to low fertility, and of rather unsatisfactory physical properties. Care will be needed in draining and tilling. Its nutrient status is ideal for manurial experiments, and very interesting results should emerge from the field trial that has been inaugurated over this area.

(Sgd.) F. HARDY.

IDENTIFICATION OF LOCAL FOSSIL REMAINS.

Although the subject is hardly of agricultural significance under this head, it is interesting to record the identification of the local so-called "palm" fossils, as a product of a marine organism. The Department is indebted to Mr. W. R. Forrest engaged on palaeontology and geology in Antigua, for this determination and for the following extracts which are taken from his report.

"They are the product of a marine organism having an affinity with a very remarkable group of varied organisms also of Lower Oligocene age, and are new to science.

The details were well preserved with the characteristic structures in evidence, corresponding with the Antigua Woods in that respect, so they cannot be assigned to the Vegetable Kingdom.

One of your specimens simulating Palm structure was interesting, as it is a rare type here, only five recorded so far and all diff rent."

PROGRESS IN THE CHIF INDUSTRIES.

SUGAR.

The sugar markets remained depressed throughout the year and continued economy was necessary in the sugar industry. The beneficial effect of the Sugar Preference was thus fully felt and enabled the managements to carry out certain improvements in order to lower the cost of production. The more important innovations included the introduction of Caterpillar-Tractor ploughing on a larger scale, and the installation of a crushing machine for grinding coral lime to specified grades for use as a soil amendment.

More attention to closer planting, improved drainage, the continued replacement of poor yielding canes by the standard variety B.H. (10) 12, the control of Moth-borer losses by soaking the seed-pieces, and the introduction and release of parasite flies to establish a natural check on moth-borers, are the other chief features of the industry during the year.

The total crop production was again satisfactory being slightly above the large crop of 1932, a total of 5,474 tons of first and second sugars being made as compared with 5,452 tons in the previous year. The yield of sugar was also improved from one ton per 10.5 tons of canes to one ton per 9.5 tons. The area in cane has not been extended and remains at about 4,100 acres.

Weather conditions were very unfavourable for the new crop 1934, being excessively wet in November when heavy flood caused losses in most lowlying areas, estimated at 18 to 20 per cent. of the total crop.

The exported crop of sugar for 1933 was 4,940 tons valued at £46,493 as against 4,990 tons at £46,466 in 1932. Of this export, 4,441 tons valued at £41, 406, (£9 6 5 per ton) was consigned to the United Kingdom, and the remainder 499 tons valued at £5,087 (£10 3 10 per ton) was shipped to Canada.

The production of molasses and syrup was again increased, making a total of 207,000 gallons manufactured, of which 43,260 gallons valued at £1,417 were exported, as compared with 32,988 gallons valued at £1,453 exported in 1932. This quantity includes 30,131 gallons of fancy molasses valued at £1,327, i.e. 10*d*. per gallon, exported to Canada, an increase in this trade when compared with that of 1932, when 20,395 gallons were exported to Canada at 1/4 per gallon. No molasses was exported to the United States, and a small quantity only to Bermuda. The production of Rum from factory molasses during the year amounted to 28,440 proof gallons as against 30,485 gallons during 1932. No rum was exported, the entire crop being consumed or stored locally.

The market values for sugar were discouragingly low throughout the year, and ranged from £9 2 6 per ton (Raw Preferential 96° c.i.f.) at crop period to £10 12 6 in midseason and concluding at £9 6 8 in December sales.

The following figures show the exported quantity and value of sugar products for the last five years, and indicate a gradual recovery in the industry. This will be helped to a considerable extent by the opening of the Canadian market to sugar and the increase of the Preference Quota from 300,000 tons rated at 2/- per cwt, to 360,000 at 3/- per cwt. Of this quota St. Lucia has been allotted 2,500 tons for export during the new crop 1934 :—

	Sugar			Molasses.	Molasses & Syrup.		Total Value Sugar Products.
	Production tons.	Export tons.	Value £	Production gals.	Export gals.	Value £	
1929	4,997	4,536	51,237	...	127,273	3,047	54,284
1930	5,153	4,567	45,289	...	157,254	2,872	48,161
1931	4,572	3,973	35,554	162,000	24,837	1,194	36,748
1932	5,452	4,990	46,466	...	32,988	1,453	47,919
1933	5,474	4 940	46,493	207,000	43,260	1,417	47,910

RUM

	Production p. gals.	Export gals.	Value £.
1929	39,198	2,043	339
1930	29,918	1,597	288
1931	31,003	...	...
1932	30,415	...	...
1933	28,540	...	...

Sugar-Cane Manurial Experiments.

The Manurial Experiment plots started at Mont D'or Estate, Roseau, in 1932 have been continued during 1933. This experiment was designed to yield information on the economic value of varying dosages of Sulphate of Ammonia, commencing with a standardised planting of new canes of the variety B.H. (10) 12 planted in October, 1931. Twenty 1/30 acre plots were used for the trials, and all of these received equal applications of about fifteen tons of pen manure per acre. There were five different treatments, each treatment being repeated four times. The following notes indicate the treatments with the dosages calculated per acre and the average yields calculated in tons of cane per acre from each treatment, the plots being reaped in March, 1933.

		Tons per acre.
I	Control, No. Sulphate	37.9
II	200 lb. Sulphate per acre = 40 lb. Nitrogen yield	42.3
III	300 ,, ,, ,, ,, = 60 lb. ,, ,,	47.6
IV	400 ,, ,, ,, ,, = 80 lb. ,, ,,	43.0
V	600 ,, ,, ,, ,, = 120 lb. ,, ,,	47.5

In consequence of the uneven increases in the applications of fertiliser in the different treatments, Mr. P. E. Turner, Chemist of the Trinidad Sugar Cane Investigation Committee, reported that statistically it was impossible to show that the various increments of yield were due to treatment, rather than to soil variation, without using a complicated mathematical procedure. It seemed likely, however, that 300 lb. Sulphate of Ammonia per acre was the optimum dose, an increase in yield of nearly ten tons of cane per acre being a quite possible figure. The average annual application of Sulphate of Ammonia in this area is approximately 300 lb. per acre.

To make analysis of the yield data more simple, the experiment has been revised and is being repeated on the same area and using the first ratoons, but with regular incremental doses of Sulphate of Ammonia in place of the above, viz :—

I	Control—No Sulphate.
II	150 lb. Sulphate = 30 lb. Nitrogen per acre.
III	300 ,, ,, = 60 ,, ,, ,, ,,
IV	450 ,, ,, = 90 ,, ,, ,, ,,
V	600 ,, ,, = 120 ,, ,, ,, ,,

A further experiment has been laid down on plant canes at Roseau Estate. In this experiment a Latin Square is used and consists of a number of treatments equal to the number of replications used, in this case being five treatments. The term "square" as conventionally applied includes grouping of the more or less square plots under this arrangement which is adopted to eliminate the errors due to soil differences. This experiment consists of twenty-five acre plots, with the same rates of application of Sulphate of Ammonia as for the first ratoons in the above experiment. The canes in these plots were planted after an application of 15 tons of pen manure per acre, in December 1932, slaked lime was applied in January, and the sulphate was applied in March, 1933.

The standard of cultivation in the sugar valleys generally has improved

and this has been reflected in better yields. Only in the Mabouya Valley has the acreage under cane been increased, in the effort which is being made to bring the formerly abandoned fields under cultivation. In this work the tractor is a useful asset, and apart from better tillage, has to a great extent reduced the annual expenditure on weeding.

This Department here records its appreciation of the willing and practical co-operation of the managements of the sugar estates in the carrying out of Moth-borer counts and manurial experiments.

CACAO.

The cacao markets continued to be depressed by excess stocks and low consumption throughout the year and the lowest prices on record were reached during the closing months, November and December, when St. Lucia grades were quoted at 27/- per cwt. c.i.f. London. In several cases, growers were instructed not to ship further incoming crops, and sales were inactive generally. The Canadian markets offered some fair contracts at the end of the year at 24/6 per cwt. c.i.f. St. John and this facilitated the disposal of some accumulated stocks. This new departure was due to a large extent to the co-operation of the Canadian Trade Commissioner for the Eastern Group, who took up the matter on behalf of the Agricultural Department. The firm of Messrs. Rowntrees, Montreal, was interested and subsequent negotiations with the Department led to the provision of various grades of estates' cacao, followed by an initial shipment of 32 tons of selected grades of the late crop. This market has been brought to the notice of exporters, with whom the cocoa manufacturers have now been advised to deal direct through the ordinary channels of the trade. Northbound shipments for Montreal or St. John must be put in new bags, and a minimum car-load weight of 36,000 lb. approximately 180 bags is necessary to ensure sufficient freight weight. The present terms under these consignments range from $4\frac{1}{4}$ cents to $5\frac{1}{2}$ cents per lb. c.i.f. Canada, and approximately $\frac{1}{2}$ cent below the ruling Trinidad and Grenada levels. Preference has been expressed for the well-fermented, full, round and large bean.

Exports to Trinidad continue to be relatively large, 1,508 cwt. of various grades equal to 25 per cent. of the trade, being shipped during 1933, This cacao is reported to be mixed and re-exported from Trinidad, and objections have been raised by cacao-growers on the score of such trade depreciating the better grades. The question of introducing legislation to protect the estate brands by a system of inspection and certification has met with some opposition, and further action has been postponed until greater discrimination in quality and prices ensure a stronger claim for the classification and control of this trade.

The severe wet weather affected the Easter crop and again in November, when pod diseases reduced the output. Peasants' cacao has been generally neglected, and attention has been directed to provision crops and bananas for export. Citrus orchards are being extended by the larger estates and the cacao area has accordingly been reduced to about 5,000 acres.

The total exported crop was 6,056 cwt. valued at £6,778 as compared with 8,188 cwt. valued at £9,091 in 1932.

Cacao Exports—5 year period 1929—1933 :-

		Export cwt.	Value £
1929	...	8,906	18,864
1930	...	10,449	19,261
1931	...	10,419	14,125
1932	...	8,188	9,091
1933	...	6,056	6,778

LIMES.

The total exported lime crop of the Colony estimated in barrels of limes amounted to approximately 44,019 barrels valued at £19,682, a decrease in crop volume of only 1.6 per cent. This takes into consideration the large carry-over of lime oils from the 1933 crop, which was being marketed early in 1934, for the improved prices then obtaining. The actual exported crop of the Colony for the year January—December was 38,683 barrels valued at £15,828 as compared with 44,762 barrels valued at £20,781 in 1932.

The small decrease noted above was due to a slight reduction in the crop of the season through prevailing wet weather and to lower market prices generally, resulting in neglected harvests on some few estates.

The estimate of lime orchards in the Colony, based on averaged estate returns in barrels of fruit, is approximately 500 acres of fruiting trees calculated to yield 90 barrels per acre. To this should be added 500 acres of new crop areas now coming into bearing, plus newly planted trees up to 80 acres for 1933, a total orchard area of 1,080 acres. This figure replaces the earlier estimates and does not include neglected areas.

Planting is proceeding more steadily and budded trees are now being used more commonly in preference to the seedling limes, the aim being to establish the orchards on a more permanent basis and increase the crop gradually with the expansion of the markets. The question of restricting the extension of the lime crop area was discussed at the West Indian Inter-Colonial Fruit and Vegetable Conference held in Jamaica in October 1933*, and it was recommended that Government lime nurseries should adopt measures to reduce the output of plants, pending a firmer position in the lime industry. A replacement figure of approximately 4,000—5,000 trees per annum has therefore been adopted for St. Lucia for the present.

The yield of lime oils for St. Lucia is calculated at 6.8 oz. per barrel on the average of the four principal estates, and is realised as follows :—

	Ounces per brl.
Hand-pressed Oil	2.2
Distilled Lime Oil...	3.4
Lost in Manufacture	1.2
Total content of oils	6.8

The crops for the last five years in barrels of lime are given below :-

Year.	Quantity. Barrels.
1929	34,483
1930	42,844
1931	50,339
1932	44,762
1933	44,019

The exports of concentrated juice were increased from 7,280 gallons in 1932 to 16,208 gallons in 1933, to some extent through shipment of stocks from stored juice. The market for this product has remained unattractive at £4 10 0 per pipe c.i.f. Very little trade was done in raw lime juice.

The production of distilled lime oil was again the principal feature of the crop. The quantity exported for the period January—December was considerably lower than for the past three years; 7,582 lb. of distilled oil valued at £7,412 being exported as compared with 10,345 lb. at £11,662 for the previous year. The market prices were erratic, with a downward tendency as supplies accumulated by the end of the year, varying from 36/- to 27/- per lb. c.i.f.

*The full Report of this Conference is published by the Government Printing Office, Jamaica.

Exports of handpressed lime oil for the same period advanced in quantity, 2,430 lb. valued at £3,021 being shipped, as against 1,989 lb. at £3,337 in 1932. The market was weaker towards the end of the year, the range of prices being from 55/- in March to 35/- per lb. in December sales.

The total export value of lime oils for January—December 1933, was proportionately three-fourths of the value of exported lime products.

The green limes export trade was fairly steady throughout the year, and shows possibilities of expansion in Canada and the United States.

The attention of manufacturers of concentrated lime juice was drawn to the possible market in Barbados for this product in the inversion of cane juice for making fancy molasses. A figure of £3 0 0—£3 10 0 per pipe of 7,000 oz. citric acid c.i.f. Barbados was quoted as competitive with other acids for this purpose.

COCONUTS.

Very satisfactory progress has been made in the export of selected edible coconuts, mainly to the United Kingdom and to New York, and it is evident that this trade benefited by the depression in copra. A total of 1,199,808 nuts valued at £3,527 was exported as against 650,240 nuts at £2,430 in 1932, an increase of 46 per cent. in the exported crop. The net return to growers in this trade is approximately $\frac{1}{2}d.$ per nut and is more profitable than copra at present.

The export crop for the year under report as calculated from exported coconut products was approximately 3 millions of nuts. Nuts were shipped principally to the following destinations.

U. K. 35%	U. S. A. 32%	Barbados 20%	Canada 10%	Bermuda. 2%
422,350	381,860	240,698	118,480	34,288

The copra market remained low throughout the year, prices falling from £13 7 6 in January to £9 17 6 in December.

The following figures show the quantity and value of exports of coconuts and coconut products during the last five years :—

——	Coconuts No.	Value £	Copra tons.	Value £	Total Value. £
1929	295,983	1,032	359	9,878	10,910
1930	268,078	862	400	7,428	8,290
1931	367,350	1,178	498	5,869	7,047
1932	650,240	2,430	432	5,389	7,819
1933	1,199,808	3,527	542	5,167	8,694

The plantations remained in good condition generally, though some losses were experienced during the wet weather and floods of November by palms and nuts being carried out to sea. The subsequent deaths from budrots and leaf diseases have, however, been small, and provided that proper sanitation and adequate drainage is maintained, there should be no extension of disease beyond the average low incidence. The results of the detailed survey and treatment of diseases carried out in 1927—1930, are now seen in the healthy condition of the groves and the freedom from serious epidemics. The Dwarf Coconut is yielding satisfactory returns of above 100 nuts per tree annually and these are being used in the 4″—4½″ sizes for export.

The growth of the trade in export nuts has stimulated interest in the crop, and it is estimated that above 3,000,000 nuts will be shipped during 1934 in this trade.

PROGRESS IN THE MINOR INDUSTRIES.

FRESH FRUIT AND VEGETABLES.

The cultivation of vegetables and salad fruits such as cucumbers, tomato, cabbage, lettuce and carrots has continued mainly for local supply, and there has been very little export trade in these commodities.

The fresh fruit trade has however maintained its position and in several respects has markedly improved, the principal exports being green limes in crates and barrels, crated mangoes, crated avocado pears, and bananas.

The banana trade to the United Kingdom and to Canada has been seriously taken up, the growers being mainly of the small planter class, and 31 shipments were made during the year by the three principal buying agents, in all a total of 22,258 stems valued at £1,626 being exported mainly from June onwards.

The fruit was collected mainly from small holdings, and inadequate attention to cultivation and pruning had resulted in an unnecessary large proportion of thin bunches and low counts of hands as shown by the analysis which follows :—

Counts of Bunches of Bananas shipped during 1933.

Nines	Eights	Sevens	Sixes.
25%	27%	39%	9%

This matter and that of provision of disease-free plants, and the treatment of Panama disease of bananas by gas-oil, was taken up by the Agricultural Officers, and demonstrations and country meetings have been held throughout the year in the important banana areas.

Nurseries were in process of establishment in the Barre de L'isle, Mahaut Valley and the Murray Road areas towards the end of the year, to meet the demand for planting material free from disease.

The prospect of a five-year contract with the Canadian Banana Company under the recently-formed St. Lucia Banana Association, incorporated by Ordinance, has revived interest in this crop, and peasants and small holders are active in opening forest land for planting in order to reduce the risk of Panama disease. This work is being carried on under the close supervision of the travelling Agricultural Officers.

The crop for the season 1934 is estimated at about 50,000 bunches.

The following comparative schedule gives the Fresh Fruit exports and values for the five year period 1929—1933.

		1929.		1930.		1931.	
		Amount.	Value £	Amount.	Value £	Amount.	Value £
Green Limes	barrels ...	1,165	1,758	2,308	3,218	4,114	5,418
Grapefruit	crates ...	106	21	246	65	102	36
Oranges	,, ...	321	129	...	223	367	169
Mangoes	,, ...	...	1,383	...	915	9,823	2,172
Avocado Pears	,, ...	...	225	1,628	366	2,924	567
Pineapples	,, ...	...	83	49	18	67	23
Bananas	bunches ...	6,818	509	4,568	219	5,364	274
Miscellaneous	...	...	1,560	...	1,613	...	1,492
Total	...	...	5,668	...	6,637	...	10,151

			1932.						
			Amount.						Value £
			To Canada.	To Bermuda.	To U.K.	To U.S.A.	To other places.	Total.	
Green Limes	barrels	...	26	528	119	3,085	24	3,782	5,552
Grapefruit	crates	...	12	89	4	...	3	108	43
Oranges	,,	...	...	385	3	...	210	598	206
Mangoes	,,	...	195	3,491	413	...	3,655	7,754	1,655
Avocado Pears	,,	...	25	4,472	245	...	26	4,768	977
Pineapples	,,	...	85	76	44	...	1	206	96
Bananas	bunches	...	...	...	...	...	...	3,149	185
Miscellaneous	...	...	...	...	...	...	...	...	1,463
Total		...	...	...	...	...	...	...	10,175

			1933.						
			Amount.						Value £
			To Canada.	To Bermuda.	To U.K.	To U.S.A.	To other places.	Total.	
Green Limes	barrels	...	77	681	64	2,928	8	3,758	4,445
Grapefruit	crates	...	...	27	...	...	1	28	13
Oranges	,,	...	...	242	...	...	261	503	141
Mangoes	,,	...	473	4,567	5	...	2,445	7,490	1,212
Avocados Pears	,,	...	...	3,111	...	...	33	3,144	610
Pineapples	,,	...	17	89	...	...	...	106	31
Bananas	bunches	...	16,273	...	3,629	270	2,086	22,258	1,626
Miscellaneous		...	...	...	...	...	...	...	2,003
Total		...	...	...	...	...	...	...	10,081

GOVERNMENT MARKETING DEPOT, INSPECTION, AND PACKING HOUSE OPERATIONS.

Inspection under the Fruit Ordinance during the year was conducted with an improved co-operation from exporters, and a total of 15,029 packages was certified for export, as compared with 12,239 in 1932.

The Depot handled 1,797 crates packed for exporters, the remainder being packed by private agencies under supervision.

Shipments to Canada.

The fruit shipped to Canada by the Depôt on behalf of producers during 1933, together with the average net returns after deducting packing, freight and selling charges, is tabulated below.

Fruit.	Package.	Quantity.	Net return per package.
Limes	... Lug 0.6 cu. ft., 24lbs. net ...	389	1/5
,,	... Half-citrus crate, 1 cu. ft. ...	54	2/3
,,	... Full-citrus crate, 2 cu. ft. ...	9	3/-
Julie Mangoes	... Lug, 25 to 35 fruits ...	120	2/8
Pineapples	... Pineapple crate, $2\frac{1}{2}$ cu. ft. ...	16	1/7

The financial statement covering the above-mentioned shipments is as follows:

Statement of shipping transactions of Government Marketing Depôt for the year ending 31st December, 1933.

Cost of packing (materials, labour, inspection fees, cold storage dues) ...	...	£48	17	10½	Receipts from abroad ...	£132	8 8
Freight and Stamps	...	25	10	10			
Export Duty (limes)	...	3	13	4			
Payments to producers	...	52	3	6			
Commission (2½%)	...	2	3	1½			
		£132	8	8		£132	8 8

The average net return for the limes shipped, about 10/- per barrel (5 cu. ft.), 7 lugs = 1 barrel, compares favourably with the average local market price of 10/- prevailing at the times of shipment. The average return was lower than that obtained in 1932 with lime shipments to Canada from these islands, but in 1933 the price was lowered to increase the consumption (c.f. shipments of limes in lugs to Canada from Leeward and Windward Islands: 1932, 2,856; 1933, 10,465). In addition, in 1933 St. Lucia began shipments rather late and missed the very favourable early market, and low returns were also obtained with a few late shipments when the market dropped badly with rapid change of season. The citrus crate packs were only used with large fruit and these naturally brought relatively lower returns. The fruit was practically all sold in Toronto and Montreal, principally in the former market.

The shipments of Julie Mangoes, which were mostly sold in Toronto, were quite satisfactory, and the steadily good condition on arrival shows a considerable advance in the knowledge of the shipping of this fruit, the past results having been very variable. The rigid enforcement of the water flotation maturity test and precooling, combined with better handling, are undoubtedly the factors largely responsible for the better results.

The results with the pineapples shipped to St. John, which arrived in good condition and were favourably received by the trade, indicate that except on a large scale pineapple export is not remunerative.

Government Packing Shed.

A considerable quantity of fruit, particularly limes and mangoes shipped to Canada, and general Bermuda shipments, was packed by the Depot for private exporters. The packing shed was also used regularly by several persons for packing fruit under supervision for export to Bermuda.

A considerable increase in the use made of the Packing Shed, which was provided from Imperial funds, is to be recorded.

The Packing House Fees collected during the year amounted to £4 2 0.

The sum of £3 8 9 was also collected as rental fees for space used by exporters, principally for the Bermuda trade, in the Auxiliary Packing Shed.

Stock Account.

This revolving account is operated in order to purchase packing materials co-operatively for exporters. The maximum authorised expenditure is £350.

The Balance Sheet for this account for the year ending 31st December, 1933, is as follows:—

Dr.	£	*s.*	*d.*	Cr.	£	*s.*	*d.*
Balance debited to a/c at 1.1.33	266	5	6	Sales	442	13	11
Purchases during 1933 ...	305	5	8	Outstandiug Accounts (1) ...	43	12	1
Import Duty	16	10	0				
Balance (credit)	38	1	11¼	Stock on hand at 31.12.33 (2)	139	17	1¼
	£626	3	1¼		£626	3	1¼

Notes:—(1) Reduced to £25 14 7 on May 18th, 1934.

(2) This valuation is after writing down stock values by £46 10 8½ and writing off a bad-debt of £2 1 10. The writing down was relatively considerable in order to reconcile values of old stock with current prices which are much reduced owing to the drop in exchange. In addition labels costing over £11 were written off for free distribution for purposes of advertisement.

Inspection.

All fruit exported to countries outside the West Indies, with the exception of limes to the United States, was inspected. The Inspection Fees collected during the year amounted to £47 12 0 (1931, £46 19 7; 1932, £47 14 0).

WORK OF THE MARKETING OFFICER FOR THE LEEWARD AND WINDWARD ISLANDS.

Mr. A. C. Shill, M. Sc., A.R.C.S., D.I.C., A.I.C., was appointed Marketing Officer under the Colonial Development Fund for a period of two years from August, 1931. During this period his headquarters were temporarily located in Dominica, up to 1st January, 1933, when he was transferred to St. Lucia.

The co-operation of this officer has been of great value in the work of the Government Marketing Depot and his help in establishing proper standards for the export fruit trade has been much appreciated. The necessary supplies of materials, trial shipments of fruit, and trade connections with brokers and others, have been largely organised by the Marketing Officer, and his assistance is also acknowledged in preparing the above statement of the work of the Depot.

Cold Storage and Ice Factory.

The Cold Storage has been more freely used for precooling of exports, and for local cold storage, a total revenue of £76 being shown for the year. The Ice Factory manufactured 115 tons of ice and sold ice to the value of £230 during the year.

EXPORTS FROM ST. LUCIA, 1933.

	1932.			1933.		
	Quantities.	Value. £	£	Quantities.	Value. £	£
SUGAR PRODUCTS:—						
Sugar, Vacuum Pan tons ...	4,990	46,466		4,940	46,493	
Molasses & Syrup gall. ...	32,988	1,453	47,919	43,260	1,417	47,910
CACAO PRODUCTS:—						
Cacao cwt. ...	8,188	9,091	9,091	6,056	6,778	6,778
LIME PRODUCTS:—						
Concentrated Lime Juice gall. ...	7,280	78		16,208	860	
Raw Lime Juice ,, ...	4,069	152		591	40	
Distilled Lime Oil lb. ...	10,345	11,662		7,582½	7,412	
Handpressed Lime Oil ,, ...	1,989	3,337		2,430	3,021	
Green Limes brl. ...	3,782	5,552	20,781	3,758	4,445	15,778
COCONUT PRODUCTS:—						
Coconuts No. ...	650,240	2,430		1,199,808	3,527	
Copra tons ...	432	5,389	7,819	542	5,167	8,694
HONEY PRODUCTS:—						
Honey lb. ...	46,393	331		34,826	373	
Beeswax ,, ...	392	12	343	206	5	378
BAY PRODUCTS:—						
Bay Oil ... gall. ...	44	100		20	32	
Bay Rum ,, ...	1,428	276	376	1,827	398	430
Carried forward ...			86,329			79,968

EXPORTS FROM ST. LUCIA—(*continued*).

		1932.			1933.		
		Quantities.	Value. £	£	Quantities.	Value. £	£
Brought forward	...	...		86,329	...		79,968
SPICES:—							
Nutmegs	lb. ...	5,872	79		6,834	80	
Mace	,, ...	1,064	48		1,326	58	
Kola Nuts	,, ...	17,389	110		13,760	108	
Miscellaneous	,, ...	2,623	29	266	2,347	22	268
VEGETABLE PRODUCTS:—							
Plantains	bchs.	203	16		341	22	
Farine	lb. ...	14,642	99		12,530	61	
Yams	,, ...	...	36		...	25	
Miscellaneous	...	...	416	567	...	214	322
FRESH FRUIT & PRODUCTS:—							
Bananas	bchs.	3,149	183		22,258	1,626	
Mangoes	crates...	7,754	1,655		7,490	1,212	
Oranges	,, ...	598	206		503	141	
Grapefruit	,, ...	108	43		28	13	
Pineapples	,, ...	206	96		106	31	
Avocado Pears	,, ...	4,768	977		3,144	610	
Mixed Fruits	...	...	1,463		...	2,003	
Preserved Fruits,	...	...	...		...	117	
Jams, Jellies, &c.	...	...	133	4,756	...	43	5,796
FOREST PRODUCTS:—							
Boards (native)	c. ft. ...	1,009	73		1,871	151	
Cedar	,,	34	1		...	...	
Firewood	cords ...	845	338		793	290	
Logwood	tons ...	...	...		10	25	
Hardwood	c. ft. ...	2,430	222		3,116	248	
Brooms	doz. ...	1,384	53		952	35	
Charcoal	bags ...	79,960	4,042		85,840	4,327	
Furniture (Household)	...	...	685		...	333	
Miscellaneous	...	...	1	5,415	...	...	5,409
LIVE STOCK & PRODUCTS:—							
Cattle	No. ...	...	...		...	...	
Hides & Skins	,, ...	1,668	126		2,240	122	
Shells, Turtle	lb. ...	401	114		105	22	
Fish Oil	gall. ...	...	...		...	...	
Horses	No. ...	21	85		63	288	
Mules	,, ...	7	28		23	126	
Asses	,, ...	3	5	358	5	11	569
MISCELLANEOUS PRODUCTS	...		194	194		275	275
Total Exports	...			97,885			92,607

AGRICULTURAL OUTLOOK.

The total value of exports consisting mainly of agricultural products was £92,607 as compared with £97,885 for the previous year. This decrease in value was due to the low prices and reduced exports of cocoa which were depreciated in value by about £2,300; and to the non-shipment of lime oils

which were stored to await a rise in the market prices, and accounted for a reduction in export values of approximately £4,000; and to a slower trade in green limes which was depreciated by about £1,000. On the other hand, coconut exports increased in value by about £1,000 and bananas by approximately £1,500, and these to some extent offset the losses indicated above. Owing to low prices on sugar, cocoa, copra and lime juices, very little export duty was chargeable on the sliding scales adopted for these products.

The general position of agricultural industry appears to be sound inasmuch as the worst of the universal trade depression has been weathered, and it is permissible to anticipate better conditions in the future now that returning confidence has engendered a trade revival in the important markets of raw materials. The over-production and low consumption of cocoa has not yet been remedied, however, and this crop is likely to further lose its popularity now that the plantations are being affected by neglect and diseases.

The growth of the coconut and banana industries are hopeful features, the former of these crops being particularly well suited to the conditions under which it has become established. Banana production is on the increase, but this crop will remain largely a peasant industry, to which it is well adapted. The extension of citrus planting in the holdings will further assist in establishing permanent cultivations to replace the temporary gardens.

PEASANTS' DEVELOPMENT

The increased activity among the small holders consequent on the extension of bananas, and the larger number of budded citrus available at a nominal rate, or for free distribution, has fully engaged the time of the Agricultural Instructor and Agricultural Officer. Both these officers and other members of the staff have been almost continually on tour. A greater appreciation of these services is becoming evident among the small planters.

The following notes refer to the principal features of peasant agriculture for the period under review.

Ground Provision.

There was no scarcity of these crops during the year, and the increase of the coastal motor launch services has facilitated the marketing of produce from the interior, to such an extent that produce is frequently difficult to obtain near the coastal villages. This trade is carried on principally by sailing sloops with Barbados and the Northern Islands, the owners or masters of the vessels generally purchasing the produce locally and marketing it on their own behalf. Speculators also tour the holdings, purchasing and bulking the crop for resale overseas.

Vegetables, Pulse Crops, Onions and Garlic.

The weather was wet and unfavourable to the growth of soft vegetables, and of onions etc., and imports of the latter crop were made for local supply at the end of the year. Improved shallots and garlic sets have been introduced for the drier areas, and a plentiful supply of vegetable seedlings was grown and distributed from the Nurseries.

Improved care in the management of these minor crops has been evident, and a wider range of vegetables is being adopted.

Peasants' Orchards Extension.

The conditions under which oranges and grapefruit can be grown by peasants in the interior are favourable to the development of clean, juicy and well-formed fruit, and it is considered that this crop could be extended coincident with banana cultivation in certain areas. The head loads of ground provisions now transported to the main roads or to markets, are not so valuable as citrus fruit and usually amount to 75 lb. of provisions valued at 1/- to 1/2 per basket-load. Thus the extra care needed in the handling and transport of selected fruit, could be safely incurred on account of the higher value of an equal weight of produce. Motor transport has increased very largely during the last few years and as fruit become available in bulk, this method of conveyance will replace the walks over long distances now made thrice weekly by peasants in the interior, and so allow more time for attention to the holdings.

Orchards of from ½ acre to 5 acres in extent are being established under suitable conditions, and the attention necessary for this development is given individually to the peasants by the Agricultural Officers who also arrange for the various agricultural supplies needed.

Mango Topworking.

The topworking of common mango trees into the Julie variety has been continued during the year by consolidating the earlier work. All trees that could be located have been re-examined, weeded, mulched and regrafted where necessary, and pruning and tree-surgery followed by treatment with wood paints, tar and concrete has been practised on all of the useful trees.

The number so re-established in condition for early fruiting is 4,113, including a porportion newly grafted and treated, as follows :—

District.	Successful trees located.	(Successful repaired trees)	Trees Grafted and repaired.	New trees Grafted & repaired.	Total.
Castries ...	1,094	(1,083)	347	568	2,009
Gros Islet ...	88	(86)	9	28	125
Anse-la-Raye ...	26	(26)	1	19	46
Mon Repos ...	14	(14)	...	...	14
Dennery ...	142	(142)	10	19	171
Soufrière ...	557	(400)	164	209	930
Choiseul ...	510	(503)	119	185	814
Canaries ...	4	(4)	...	...	4
	2,435	(2,258)	650	1,028	4,113

The grafting of magoes has replaced the earlier form of budding as being more generally successful and less affected during the dry season. Numerous trees have come into bearing, and a crop of over 600 fruits was reaped from one tree, three years after the topworking was done.

AGRICULTURAL INSTRUCTIONS IN THE PRIMARY SCHOOLS.

REPORT OF THE AGRICULTURAL SUPERINTENDENT ON THE TEACHING OF AGRICULTURE IN THE PRIMARY SCHOOLS OF ST. LUCIA DURING 1933.

The 25th annual examination was conducted by the Agricultural Instructor during the period November 16th to December 8th. The examination completed a quarter century of the teaching of Agriculture and School-Garden Work, and a comparison of the results is interesting in the light of conditions obtaining in 1908 when this work was first commenced, coincident with the Grants-in-aid to Primary Schools.

In the year 1908, twenty schools were entered for agricultural instruction and school gardens, and of this number, five schools conducted no practical work. The number of pupils attending these classes was not recorded for 1908, but one year later, the number is given as 454, including 19 girls.

The averages of marks given were as follows, compared with the averages of marks awarded for 1933 :—

Year.	No. of Pupils.	Condition of Garden (10).	Practical Work (10).	Theoretical Work (10).	Total (30).	Percentages (100).
1908	—*	5·05	4·5	6·7	16·25	54·1
1933	*710	7·60	7·8	8·2	23·70	79·0

* Including 83 girls.

Of the twenty schools examined during the first year of teaching, eleven qualified for 50 per cent. marks and over, one school only attaining full marks. In 1933, seventeen schools were examined, all of which attained above 50 per cent. marks, and although none was awarded full marks, six schools received 90 per cent. and an " Excellent " note.

The individual management of small plots and skilled practical operations on the part of pupils was not insisted on in the earlier days of teaching, and much progress in this direction is to be recorded. In such work, the girls occupy a distinctly useful sphere in view of the duties they are destined to carry out later on the small holdings during the absence of male labourers as hired employees.

In this connection the distribution of 428 propagated trees and seedlings during 1933 is noteworthy.

The difficulties met with in recent years refer principally to the unsatisfactory sites chosen or available as school-gardens and it is again urged upon the local School Managers that where necessary, representations should be made for the free gift or loan of small areas of land from local proprietors.

In estimating the results of this period of agricultural instruction and to what extent it may have improved the position of the labourer and small holder, consideration must be given to the vicissitudes through which the principal crops have passed and the periods of depression when crops have become unmarketable.

Warned by these reverses, the peasant has endeavoured to readjust his conditions by growing food-crops to serve as food for his family, with a surplus for market, at the same time maintaining a small area in a permanent crop. such as sugar-cane, cocoa, coffee, bananas or coconuts, and spice crops, for sale.

Further there is a well developed demand for agricultural land, needing only a guarantee of a profitable crop, for this to develop into active planting and husbandry. Such a case is exemplified in the recent growth of the Banana industry.

Local provision crops are cheap and plentiful and the markets are always well stocked. A growing trade in locally-produced English salads and vegetables such as demand skill in raising, indicates that careful attention is given to their cultivation. Official and other seed supplies are freely absorbed for planting in the holdings.

In spite of reductions in labour for the staple crops on the larger estates, in the shipping trade, and in emigrant labour, there is no serious unemployment, and work on the holdings is now replacing hired labour.

The following brief remarks refer to the examination results for 1933, which was in several respects an unfavourable year, through the severe and long continued wet weather, and from changes of teachers in several schools, thereby causing an interruption in the

school garden programme, and neglect of the garden itself. The good effort made in 1932 in orchard work led to a certain amount of slackness in maintaining too large supplies of sour orange stocks on hand, and neglect of the vegetable programme.

The number of pupils taught Agriculture during the year was 710 as compared with 702 in 1932.

There was again a large number of absentees on examination days, 35 per cent. (or 249 pupils) of the class taught agriculture, being absent, chiefly in the Canaries, Anse-la-Raye, Mon Repos and Choiseul districts. Those schools examined soon after the annual general examination had taken place, showed fewer absentees, and in future the Agricultural examination should take place immediately before or after the annual examination. There is very evident slackness in presenting pupils for the Agricultural examination, and the classes are allowed to disintegrate when once the general examinations have been negotiated.

Nine schools presented a total of 83 girls, whose theoretical knowledge compared very favourably with that of the boys. In the Babonneau School, the girl pupils budded citrus stocks better than the boys of the class.

The theoretical knowledge on the whole was satisfactory.

The practical work in many schools, however, has not shown the progress expected on the previous year's work, and was depreciated by the indifferent stocks used for budding and grafting.

Mulching of garden beds not under any crop has been neglected, and the soil has become hard and sun-baked.

These points will be brought to the attention of Teachers in the series of periodical visits for marking awards, which it is now proposed to make, instead of the main annual visit at examination time.

Saltibus school-garden plot has been neglected following the change in Teachers, and the Vieux-Fort school garden site has been unsettled. Both matters need the early attention of the School Managers. The Canaries school-garden and the garden class are giving unsatisfactory results and a better effort should be made for the ensuing year.

The following schedule gives the distribution of plants propagated or sent out by the garden classes and is a creditable show, particularly in the case of those classes that have adopted the " top-working " of trees.

Plants propagated and/or distributed during 1933, excluding Vegetable Seedlings : —

School.	Mangoes top-worked.	Mangoes grafted or budded.	Oranges budded.	Grapefruit budded.	Limes budded.	Robusta Coffee Seedlings.	Grafted Avocados.	Totals.
Castries Anglican Juvenile ...	...	16	17	...	...	...	...	33
Dennery R.C. Boys' Juvenile ...	...	16	37	15	8	...	...	76
Castries R.C. Boys' ,, ...	...	...	4	...	...	...	...	4
Riviere Dorée Anglican ...	...	7	8	...	...	...	...	15
Castries Methodist Juvenile ...	...	3	...	...	...	...	4	7
La Ressource R.C. ,, ...	5	3	12	...	...	...	...	20
Choiseul R.C. Boys' ,, ...	...	...	7	7	...	...	...	14
Laborie R.C. Boys' ,, ...	...	2	9	3	...	...	...	14
Anse-la-Raye R.C. ,, ...	1	3	6	8	...	...	...	18
Micoud R.C. Juvenile ...	...	3	...	...	...	...	...	3
Forestiere Methodist Juvenile ...	...	...	12	...	...	...	...	12
Vieux-Fort R.C. Boys' ,, ...	...	...	10	4	...	...	...	14
Mon Repos R.C. Juvenile ...	4	...	...	3	...	...	...	7
Babonneau R.C. ,, ...	5	22	...	...	...	160	...	187
Saltibus R.C. Juvenile ..	...	...	...	...	...	...	...	...
Soufrière R.C. Boys' Juvenile ...	...	...	2	...	2	...	...	4
Canaries R.C. Boys' ,, ...	...	...	...	...	...	...	...	...
Total ...	15	75	124	40	10	160	4	428

E. A. WALTERS,
Agricultural Superintendent.

EXAMINER'S REPORT.

Soufriere R.C. Boys' Juvenile.

The theoretical knowledge has shown improvement and this should be maintained during the coming year. The practical work, however, is on wrong lines and there is a tendency to cover the garden with Sour Orange stocks, thus preventing the growing of vegetables which is of equal importance in this district. Three-fourths of these stocks are inferior and should be removed at once, and on no account should the school-garden undertake to supply budded citrus trees to planters, since there is an ample quantity available from the nurseries of the Agricultural Department. Advantage should be taken of the cool season to resume the vegetable gardening, and the necessary seeds and seedlings for this work can be obtained from the Agricultural Department.

Anse-la-Raye R.C. Juvenile.

The river wall built near this garden proved of great benefit during the severe floods and has enabled the growing of vegetables such as cabbage, tomatoes, beans, yams and other vegetables. With judicious mulching this can be continued into the dry season and should serve as an object lesson to both the villagers and the pupils. The coconuts near the river are undesirable and inconveniently placed, and should be cut out and replaced by a thick retaining border of Roseau Grass (*Gynerium sagittatum*) and *Bambusa nana*.

The theoretical knowledge of the seventeen pupils, and especially of the ten girls, was satisfactory.

Choiseul R.C. Juvenile.

There had been a change of the Head Teacher at this School a few weeks before the examination, and although the theoretical knowledge was good, the practical work and condition of the garden seemed neglected at the time of the visit. This garden has a fairly large area and the plots should be green-dressed with Black-eye peas, or heavily mulched with litter while waiting for other crops, instead of allowing them to run to grass and become hard and sun-baked. The soil is poor and requires liberal supplies of pen manure and compost to grow good crops. Wood ashes should be also collected while in the fresh and dry condition from the village ovens and be applied in this state to the beds.

Vieux-Fort R.C. Boys' Juvenile.

The theoretical knowledge of the class has shown improvement, but the site of the garden is still indeterminate and this has hampered the practical work which is very important to this School. The Manager of the School should now determine where the garden site is to be and the Agricultural Superintendent should be informed, so that visits can be paid and advice given in the lay-out and practical work.

Laborie R.C. Boys'.

The theoretical knowledge was satisfactory and the practical work included crops of cabbage, tomatoes, beans, eschalot and other vegetables which had been grown with good results. A small number of budded citrus and grafted mangoes was raised and distributed to the pupils of the class. The beds in the garden need to be well mulched each year before the dry weather sets in.

Saltibus R.C. Juvenile.

The theoretical knowledge was fair, but owing to a change of Head Teacher, the practical work and routine in the garden did not receive sufficient attention. The piece of land used as a school-garden seems to have been regarded as a perquisite of the Schoolmaster and the work of the garden was consequently neglected. Failing an early settlement of this matter a new piece of land should be obtained as soon as possible.

Riviere Doree Anglican Juvenile.

A good standard of practical work was maintained at this School during the year. Healthy citrus plants have been grown and distributed, and crops of tomatoes, beans, cabbage, eschalot and other vegetables have been cultivated.

A good mulch of dry grass and litter is essential in this garden, and this allows vegetable cultivation being continued into the dry season which is a long one in this district. A fair quantity of vegetable seedlings was distributed to pupils and this should be encouraged with the object of replacing the inferior varieties which are too frequently grown in this district. The theoretical knowledge especially in the case of the girls, was good.

Micoud R.C. Juvenile.

The theoretical knowledge was very satisfactory. The practice begun last year of bedding in large quantities of stable manure and sea moss was continued and this enabled crops of cabbage, beans, sweet pepper, eggplants and papaws to be grown with good results. Heavy mulching is necessary during the dry season, and only a few sour orange stocks should be grown here for practice in budding.

Mon Repos R.C. Juvenile.

The condition of this garden has improved but the soil being poor and heavy, needs to be ameliorated by frequent applications of pen manure and compost. A heavy mulching should be put in before the dry season sets in, to prevent the soil from becoming baked. Crops of beans, cabbage, yams, and sour orange stocks have been grown with fair results, and top-working of mangoes on neighbouring lands formed a part of the practical work.

Dennery R.C. Boys'.

The theoretical knowledge was good and the garden work on the whole was very satisfactory. The garden has been continuously cropped throughout the year, with cucumbers, melons, leek, onions, garlic, tomatoes, cabbage, beans, and vegetable marrow, most of which gave good results. In addition to this, budded citrus, grafted mangoes, and vegetable seedlings have been grown and distributed. Heavy mulching has been largely responsible for the good results obtained from this garden.

La Ressource R.C. Juvenile.

The theoretical knowledge, especially in the girls of this class was satisfactory. The garden is exposed to high winds, consequently the hedges forming wind-breaks should receive constant attention. In view of the heavy nature of the soil, liming and deep drainage must not be neglected. Crops of yams, cabbage, beans, eggplants and other vegetables, were grown with fair results, but liberal applications of pen manure and compost must be applied for these to continue. Only a few sour orange stocks should be grown for practice in budding and these, if attacked by scab disease, should be rooted out and burnt.

Forestiere Methodist Combined.

The theoretical knowledge at this school was good and although the class is very small, the practical work and garden serve as object lessons for the whole district. Good crops of ginger, chives, garlic, onions, cabbage and yams were under cultivation and similar crops were seen on peasants' holdings throughout the district. Grafted mangoes are unsuitable for the lands around this school, but more work should be done with budded citrus.

Babonneau R.C. Combined.

The theoretical knowledge was satisfactory, and both boys and girls of the agricultural class are enthusiastic about their garden. The girls are able to bud citrus better than the boys. The site is very windy and the Gliricidia hedges that form wind breaks should receive constant attention. Crops of yams, pine-apples, cabbage, tomatoes and other vegetables were grown with fair results and the plant distribution included budded mangoes and *Coffea robusta* seedlings. Applications of mulch and compost will enable vegetables to be grown well into the dry season.

Castries R.C. Boys'.

The theoretical knowledge was very good, but the class suffers from inadequate room for practical work. A good attempt at box gardening was made with crops of lettuce, tomatoes, cabbage and sweet pepper with useful results, and a creditable quantity of vegetable seedlings was grown and distributed to the pupils.

Castries Methodist Juvenile.

The theoretical knowledge was very satisfactory, and good use has been made of the small garden. The crops included yams, beans, cabbage, lettuce, eggplant and sweet pepper in small quantities, but the various processes were well explained. More attention should be paid to box gardening to enhance the practical work.

Castries Anglican Juvenile.

The theoretical knowledge of the pupils, especially of the girls, was very satisfactory. The garden was cropped with beans, cabbage, lettuce, tomatoes and other vegetables. The recent heavy rains have washed the beds heavily, and these instead of running down hill, should be remodelled by being laid out across the slopes and so conserve moisture and avoid washing, before they are remanured and replanted.

Canaries R.C. Juvenile.

The theoretical knowledge was fair, but the practical work and condition of the garden is still very disappointing. The manner in which the work is done does not interest the pupils, and efforts should be made in 1934 to improve on this by useful practical work.

RESULTS OF PUPIL TEACHERS' EXAMINATION IN AGRICULTURE, 1933.

Names.	School.	Marks.
POSSIBLE MARKS.		100
Probationers.		
Rio Fevrier ...	Mon Repos R.C.	78
Michael Martyr	Vieux-Fort R.C.	74
Edwin Darcheville ...	Choiseul R.C.	72
Anthony McClean ...	Micoud R.C.	70
Mathew G. St. Clair ...	Soufrière R.C.	68
Gregory Edwards ...	Dennery Boys' R C.	60
Albert Francis ...	La Ressource R.C. (Combined) ...	55
O'Kenson St. Ange ...	Canaries R.C.	52
Gregor James ...	Laborie Infant	50
Julius Mondesir ...	Castries R.C.	50
Victor Polius ...	Castries R.C.	50
Julian Branch ...	Castries R.C.	50
Cyril Deterville ...	Canaries R.C.	42
First Year.		
Ignatius Antoine ...	Choiseul R.C.	80
Alexander Hunte ...	Micoud Juvenile	79
Jones Mondeisr ...	Soufriere R.C.	60
Harold St. Aimer ...	Laborie R.C.	57
Leo Hodge ...	Dennery R.C.	57
Philip Finisterre ...	Gros Islet Juvenile	50
Kent Hippolyte ...	Castries R.C. Boys'	50
Second Year.		
Gilbert Stanislas ...	Choiseul Boys' Juvenile	80
Hamilton Joseph ...	Riviere Dorée Juvenile	64
Willie Andrew ...	Anse-la-Raye Juvenile	56
Jonathan Saltibus ...	Saltibus Infant	50
Joseph Paul Antoine ...	Soufrière R.C. Boys'	50
Third Year.		
Julius Denny ...	Castries R.C. Boys, ...	85
Jerome Peter ...	Vieux-Fort Boys'	78
J. C. Beausoliel . .	Soufrière Boys'	71
Charles Eugene ...	Castries R.C. Boys'	50

LIST OF MARKS AND STANDING OF SCHOOLS IN AGRICULTURAL TEACHING.

School.	No. of Pupils examined.	Condition and use made of garden.	Practical work and knowledge.	Theoretical knowledge.	Total.	Percentage.	Result Note.
Possible Marks	—	10	10	10	30	100	—
Castries Anglican Juvenile	48(a)	9	9	9	27	90·0	E.
Dennery R.C. Boys' ,, ...	23	10	10	7	27	90·0	E.
Castries R.C. Boys' ,, ...	84	8	9	10	27	90·0	E.
Riviere Dorée Anglican	12(b)	10	9	8	27	90·0	E.
Castries Methodist Juvenile	23	8	9	10	27	90·0	E.
La Ressource R.C. Combined ..	19(c)	9	10	8	27	90·0	E.
Laborie R.C. Boys' Juvenile ...	21	8	8	9	25	83·3	V.G.
Anse-la-Raye R.C. ,, ...	17(d)	8	8	8	24	80·0	V.G.
Micoud R.C. Juvenile	21	7	7	9	23	76·6	V.G.
Forestiere Methodist	8(e)	9	7	7	23	76·6	V.G.
Babonneau R.C. Juvenile	14(f)	7	9	7	23	76·6	V.G.
Mon Repos R.C. ,, ...	13(g)	8	7	7	22	73·3	G.
Soufrière R.C. Boys' Juvenile ...	65	7	7	8	22	73·3	G.
Choiseul R.C. Boys' ,, ...	25	7	7	8	22	73·3	G.
Vieux-Fort R.C. Boys' ,, ...	34	5	6	10	21	70·0	G.
Saltibus R.C. Juvenile	21(h)	5	6	8	19	63·3	G.
Canaries R.C. ,, ...	13(i)	5	5	7	17	56·6	G.

(a) including 16 girls; (b) 6 girls; (c) 8 girls; (d) 10 girls; (e) 5 girls; (f) 9 girls; (g) 9 girls; (h) 14 girls; (i) 6 girls:

R. W. NILES, *Examiner.*

ADMINISTRATION.

REPORT ON THE WORKING OF THE REUNION ESTATE AND LAND SETTLEMENT.

Land Settlement—Of the 46 lots comprising the Reunion Land Settlement, 43 have completed payments, making a total sum of £971 15 11.

Choiseul Village Extension—No more lots were taken up, and nineteen lots remain unsold.

The total revenue derived was as follows :—

	£	s.	d.
Instalments of Land Settlement		10	0
Instalments of Village extension	3	15	0
House Lots and Land Rents		19	0
	£5	4	0

CORRESPONDENCE AND DISTRIBUTION OF INFORMATION ON AGRICULTURAL MATTERS.

One hundred and eighty-six Minute Papers and one thousand three hundred and eighty-nine letters were dealt with during the year ; information was supplied and official returns rendered for the Blue Book, the Advisory Department and other Departments of the Imperial College of Tropical Agriculture, the Imperial Agricultural Bureaux, the Imperial Institute, the International Institute of Agriculture (Rome) and miscellaneous overseas enquiries.

Several reports and publications which were presented to the Library are gratefully acknowledged.

The following books have been recently added to the Reference Library—"A Note Book of Tropical Agriculture", by Professor R. C. Wood ; "Timbers of Tropical America" by S. J. Record & C. Mell ; "An Economic Entomology of the West Indies", G. N. Wolcott.

Museums

The Carnegie Library, Castries, was visited by the Museums Commissioners (the late) Dr. F. A. Bather, F.R.S., and Mr. T. Sheppard, M.Sc., Director of Museums, Hull, who inspected the museums of the British West Indies during the tour arranged by the Museums Association and financed by the Carnegie Corporation, for the purpose of assisting these establishments to become useful sources of culture and of educative value.

Suggestions were made as to the proper provision of museum equipment and exhibitional material for the local museum, and it is hoped that a definite step in providing funds for this much-needed project will be taken in the near future.

The Agricultural Superintendent has agreed to take charge of present unclassified exhibits, and will gladly receive any others of general or local interest, for exhibition as soon as facilities become available.

EXPENDITURE AND REVENUE.

Expenditure.

HEAD XVIII.			
Personal Emoluments	£1,527	7	11
Travelling Allowance to Agricultural Superintendent ...	100	0	0
Travelling Allowance to Assistant Agricultural Superintendent ...	59	15	0
Travelling Allowance to Agricultural Instructor	120	0	0
Travelling Allowance to Agricultural Officer	45	16	0
Travelling Allowance for Visiting Officers of the Imperial Department of Agriculture	2	5	0
Labour, Union and Castries Stations	364	19	1
Seeds, Plants and Manures	46	13	4
Transport and Animals	24	3	11
Miscellaneous Requisites	43	13	11
Printing, including Publicity Work and Purchase of Books ...	4	18	11
Minor Repairs to Buildings, Union and Castries	9	16	3
Freight and Transport of Plants	9	11	11
Contingencies, including expenditure on plant disease ...	10	2	5
Demonstration Fruit and Vegetable Plot	47	19	4
Experimental Lime Plot at Union Station	99	9	4
Agricultural Cadets	123	7	5
	£2,640	0	7
HEAD XVIIIA.			
Diversion of River Bed	24	0	0
HEAD XVIIIB.			
Agricultural Society, grant-in-aid	20	0	0
HEAD XXIII.			
4 (*a*) Government Fruit and Vegetable Depot—expended locally and with Crown Agents	310	15	3
4 (*b*) Peasants' Development Service—expended locally and with Crown Agents	373	8	7
6—Citrus Cultivation—expended locally and with Crown Agents ...	£743	18	0

Revenue.

HEAD	IV.	17.	Fees for Fruit Inspection	£47	12	0
		20.	Sales from Agricultural Stations	121	11	8
	X.	1.	Land Settlements, Rents	5	1	0
	XXIII.	6.	Sale of Citrus Plants	118	11	2
				£292	15	10

OFFICIAL VISITORS TO THE STATIONS.

His Excellency Sir Thomas Alexander Vans Best, K.C.M.G., K.B.E., Governor and Commander-in-Chief of the Windward Islands; His Excellency C. W. Doorly, C.B.E., Acting Governor of the Windward Islands, His Honour Arthur Grimble, Administrator, St. Vincent; General Sir Charles Ferguson, Bart., G.C.B., G.C.M.G., M.V.O., LL.D., Chairman, Closer Union Commission, with Sir Charles Orr, K.C.M.G., and Mr. S. Macneil Campbell, Secretary; Dr. L. P. McGuire; Dr. J. G. Myers, Sc.D., Entomologist, Imperial Institute, and Mr. Harold E. Box, Entomologist, Antigua; Mr. F. A. Stockdale, C.M.G., C.B.E., Agricultural Adviser to the Secretary of State for the Colonies; Mr. G. A. Jones, Dip. Agric., Commissioner of Agricultural; Mr. A. K. Briant, M.A. (Cantab.), Assistant to the Commissioner of Agriculture; Mr. C. H. B. Williams, Dip. Agric. (I.C.T.A.), Department of Agriculture, British Guiana; Mr. R. D. Baker, B.A. (Cantab.), I.C.T.A.; Mr. A. C. Shill, M.Sc., A.R.C.S., D.I.C., A.I.C., Marketing Officer; Hon. G. McG. Peter with Messrs. J. duBoulay, Geo. Barnard, André duBoulay, Members of the Board of Agriculture; Hon. G. H. W. Palmer and Capt. W. Lambert.

There was a large number of other visitors to the Stations during the year.

STAFF CHANGES.

Mr. A. F. Nichols, Dip. Agric. (I.C.T.A.), A.I.C.T.A., Assistant Agricultural Superintendent, was on three months vacation leave from 30th March to 30th June. Mr. Nichols was appointed Chief Fruit Inspector as from 11th August, 1933, and Manager, Government Marketing Depot, as from 1st October, 1933.

Mr. G. A. Beaubrun, Chief Clerk and Accountant, was transferred to act as Revenue Officer and Keeper of the Spirit Warehouse from 1st November.

Mr. G. M. Glasgow, Agricultural Officer, was on one month vacation leave from 26th January to 26th February.

Mr. W. H. French, Clerk to the Agricultural Superintendent, was transferred to the appointment of Clerk and Assistant Sub-Collector, Soufrière, from 16th August.

Mr. C. C. E. Charles was appointed to act as Clerk to the Agricultural Superintendent, from 16th August, and also acted as Accountant vice Mr. Beaubrun from 1st November.

Miss A. Inglis was appointed Clerk to the Agricultural Superintendent from 16th August.

Mr. W. A. Lewis, Copyist, resigned his post at the end of six weeks vacation leave, from 21st July to 31st August.

Mr. Geo. St. Jour was appointed Copyist on 1st September 1933.

Mr. C. Wardrope's services as Foreman, Botanic Gardens, were dispensed with as from 1st March.

Mr. J. R. L. Johnson, Manager, Government Marketing Depot, was on six weeks vacation leave from 1st October to 15th November: his services in the Agricultural Department terminated on 15th November.

Mr. E. A. Adey, Engineer, Castries Electrical Power Station, was appointed temporarily as Supervising Engineer to the Government Cold Storage Plant as from 1st October 1933.

METEOROLOGICAL OBSERVATIONS.—APPENDIX I.

STATION, CASTRIES, ST. LUCIA, B.W.I.

LONGITUDE=60° 59′ 49″ W. LATITUDE=14° 0′ 36″ N. HEIGHT ABOVE MEAN SEA LEVEL=10ft.

Month.	Air Temperature.				Absolute Max. and Min.				Relative Humidity % (Glaisher's factor.)		
	7 a.m.	12 noon	5 p.m.	Mean	Max.	Date	Min.	Date.	7 a.m.	12 noon	5 p.m.
January ...	76·0	83·3	79·0	79 4	87	7th	64	19th	89	65	84
February ...	74·5	82·1	79·2	78·6	88	1st	63	3rd	88	63	78
March ...	76·2	83 7	79 4	79·7	87	31st	67	9th	84	62	78
April ...	78·1	85·3	80 6	81·3	89	25th	68	19th	81	58	76
May ...	79·1	85·9	80·1	81·7	90	28th	72	1st	80	61	76
June ...	80·0	84 8	81·4	82·0	90	14th	70	15th	77	68	76
July ...	80 6	82·1	83·2	81·9	92	29th	71	1st	79	74	73
August ...	77 8	84 2	81·0	81·0	92	30th	70	5th	84	65	75
September	78·2	84·9	80·6	81·2	92	5th	71	1st	88	72	75
October ...	77·0	83·8	80 5	80·4	90	8th	69	31st	93	74	78
November	75·5	82·5	78·9	78·9	88	19th	70	1st	94	77	83
December ...	74·5	81·2	78·1	77·9	88	17th	69	8th	88	72	80
Year ...	77·3	83·7	80·1	80·3	92	29th July	63	3rd Feb.	85	68	79

APPENDIX II.

ht.=3′ 0″ *hr.*=1′ 10″. STATION CASTRIES.

Month.	Rainfall (inches)			Weather.		Wind. No. of Observations of (at 7 a.m., 12 noon & 5 p.m.)								
	Total	Max.	Date	Days of Rain	Days of Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm
January ...	5·29	1·52	15th	16	0	0	0	75	8	0	0	0	0	10
February	3·12	0·82	15th	11	0	0	0	54	21	0	0	0	0	9
March ...	4·20	2·25	17th	14	0	0	0	74	11	0	0	0	0	8
April ...	5·48	4·00	11th	10	0	0	0	71	2	0	0	0	0	17
May ...	9·80	2·85	19th	16	0	0	0	71	3	0	0	0	0	19
June ...	11·68	3·30	28th	24	0	0	0	79	1	0	0	0	0	10
July ...	11·17	1·25	4th	25	0	3	2	58	2	0	1	2	0	25
August ...	15·19	3·69	16th	20	0	5	0	48	0	1	0	2	0	37
September	16·23	2·47	25th	25	0	0	0	38	0	0	3	15	0	34
October ...	15·01	2·94	20th	16	0	1	1	61	0	4	0	3	0	23
November	21·30	3·50	7th	30	0	9	2	51	1	7	0	4	0	16
December	3.36	0·57	14th	26	0	11	0	59	0	11	0	3	0	9
Year ...	121·83	4·00	11th April	233	0	29	5	739	49	23	4	29	0	217

ht.=Height of therm. above the ground in feet.
hr.=Height of the rainguage above the ground in feet.

MEMORANDUM ON METEOROLOGICAL CONDITIONS DURING THE YEAR 1933, SAINT LUCIA, B.W.I.

Rainfall: The rainfall recorded at the Botanic Gardens, Castries, for the year 1933 was 121.83 inches and is the highest on record within recent years. This was 18.66 inches above that for the previous year which was also severely wet and 30.36 inches above the average rainfall for 44 years (1890—1933) the average now being 91.47 inches per annum. Maximum precipitation for Castries occurred on April 11th when 4.00 inches rain fell and on August 16th—3.69 inches and again November 7th when 3.50 inches fell in Castries, on this occassion a fall of 4 inches in 4 hours being recorded. Maximum precipitation in the Colony was 8.50 inches on November 7th when severe floods occurred in most of the river valleys, and caused loss of cane-crops, and some orchard trees. Land slips were frequent during the wet season and resulted in distress to peasantry through loss of provisions. The new roads in wet areas suffered from subsidence. The distribution of rainfall throughout the Colony was generally in excess, and no well-defined dry season occurred.

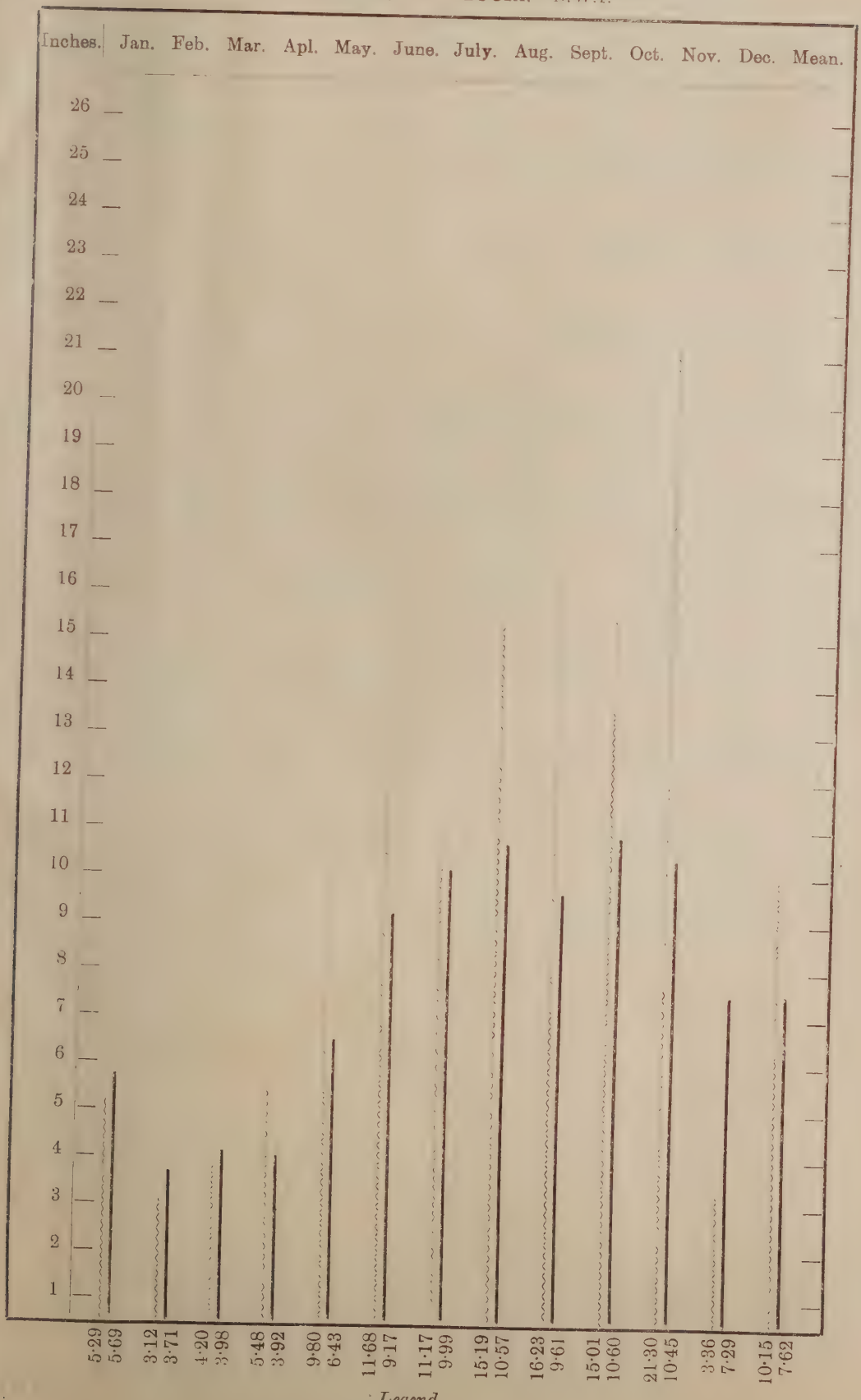
Temperature: Temperature records at the Botanic Gardens, Castries, show a mean noon temperature of 83.7° in the shade. The maximum temperature was 92°; the minimum 63°, a range of 29°. Day and night temperatures generally were somewhat lower than usual. The relative humidity was higher than usual during the months of August and November when hurricane conditions were forming in the Western Caribbean.

Weather: The weather generally was very wet. No hurricanes were felt in the Colony, apart from the heavy sea swell.

Stations: The number of stations recording during the year was 35. The Agricultural Superintendent desires to thank recorders for their co-operation, and asks that this assistance be continued, as a means of building up a valuable record of rainfall statistics for the Colony.

APPENDIX III.

AVERAGE MONTHLY RAINFALL—44 YEARS (1890—1933)
CASTRIES, ST. LUCIA, B.W.I.



Legend.

——— Average for 44 years.

..... Rainfall during 1933.

APPENDIX IV.

RAINFALL RETURNS, 1933.

Observation Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Maximum in one day and date.			No. of days of rain.
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.			
Gros Islet, Reduit Estate	4·50	2·21	1·72	1·79	2·49	6·39	6·82	9 38	11·44	7·92	17·90	2·12	74·68	5·40	Nov.	7th	176
Castries, Corinth ,, ...	7·12	3·38	3·39	2·22	6·50	9·29	8·94	13·21	17·55	10·38	27·08	4·19	113·25	6·75	,,	7th	191
Marquis Estate ...	5·86	2·69	2·08	...	7·53	9·67	6·40	14·09	17·55	11·14	19·85	...	96·86*	5·07	,,	7th	207
Union	7·22	2·74	3·78	1·88	5·48	6·18	6·57	8·24	13·79	8·79	21·73	3·12	89·52	6·07	,,	7th	271
Choc Estate ...	5·42	2·54	3·50	2·64	6·21	8·10	7·23	9 56	11·60	8·69	24·14	3·40	93·03	4·63	,,	7th	196
Botanic Gardens ...	5·29	3·12	4·20	5·48	9·80	11·68	11·17	15·19	16·23	15·01	21·30	3·36	121·83	4·00	Aprl.	11th	233
The Barracks, Vigie ...	5·24	3·43	3·33	4·61	7·82	9·80	8 52	12·55	13·87	9·77	18·21	3·74	100·89	2·92	Nov.	7th	224
Soucis Est. Cul-de-Sac	9·97	3·49	3·67	3·29	...	11·32	9·65	13·50	18·02	15·63	27·09	6·69	122·32*	6·72	,,	9th	185
Crown Lands Est. ,,	19·27	7·91	3·68	3·25	11·82	16·30	13·20	19·30	21·20	19·30	42·75	10·72	188·70	8·50	,,	7th	245
La Perle Est., Roseau	9·70	1·51	3·69	1·20	6·81	9·43	9·01	12·34	13·44	9·97	19·25	1·89	98·24	3·19	,,	8th	163
Mont D'Or Est. ,, ...	12·69	3·18	3·19	2·37	4·46	12·48	9·00	15·55	22·08	16·74	23·70	6·35	131·79	5·30	,,	8th	166
Bellevue Estate, ,, ...	9·46	2·86	2·31	2·69	...	6·43	...	13 59	13·69	10·06	17·92	5·33	84·34*	3·56	,,	8th	180
Vanard ,, ,, ...	11·75	3·57	3.89	2·96	6·47	12·50	9·60	17·40	22·64	15·93	27·23	7·91	141·85	6·20	,,	7th	184
Roseau ,, ,, ...	11·65	1·97	2·63	1·79	6·54	7·39	9·77	11·78	18·55	14·08	20·96	3·80	110·91	4·00	,,	8th	175
Ravine Poisson, Estate	...	...	...	3·34	...	...	9·70	17·46	18·39	15·92	...	...	64·81*	3·50	Sep.	16th	78
Soufrière, La Perle Estate	10·10	3·19	3·15	1·49	5·40	10·17	12·71	13·33	12·49	11·71	19·12	6·05	108·91	4·90	Nov.	7th	189
Ruby Estate ...	9·32	3·05	2·71	1·65	6·17	11·90	12·89	11·06	14·40	14·07	21·74	...	108·96*	6·72	,,	7th	223
La Dauphine Estate ...	9 61	2·52	2·19	1·22	4·16	8·60	12·03	13·34	14·54	...	...	...	68·21*	2·74	Aug.	13th	166
Union Vale ,, ...	8·90	1·57	2·16	1·46	4·23	8·54	...	14·65	13·12	10·49	20·32	...	85·44*	7·50	Nov.	7th	174
Beausejour ,, ...	13·74	3·84	4·04	3·22	5 23	11·03	14·03	16·38	17·65	14·77	26·69	7·36	137·98	7·01	,,	7th	305
Belle Plaine ,, .	14·47	4·07	4·92	3·06	6·15	10·54	14·02	16·37	18·53	15·12	24·85	7·51	139·61	4·06	,,	7th	293
Choiseul, Morne Lezard Est.	8·98	2·25	2·95	2·62	4·23	8·09	11·82	11·15	13·36	11·66	18·70	4·18	99·99	3·55	,,	7th	235
Park Estate ...	11·40	3·81	3·35	2·26	5·58	9·32	12·63	16·56	17·69	15·85	19·51	6·55	124·31	3·06	Oct.	17th	275
Woodlands Estate ...	9·15	5·14	3·75	3·73	5·87	9·69	15·34	13·21	13·96	8·52	28·88	5·52	119·76	8·35	Nov.	6th	246
Laborie, Londonderry Est.	9·40	2·63	3·66	3·35	3·99	8·24	12·72	11·42	14·24	11·93	17·05	4·60	103·23	3·64	,,	7th	245
Giraud Estate ...	11·16	3·69	3·55	2·87	5·57	10·07	15·76	15·56	15·67	15·22	25·56	2·89	127·57	5·65	,,	7th	205
Black Bay Estate ...	6·10	3·30	1·00	3·10	3·65	8·25	7·80	9·20	12·10	6·30	15·00	4·10	79·90	3·50	,,	7th	129
Vieux-Fort, Retraite Est.	4·96	3·90	1·77	2·01	...	6·24	7·83	10·88	14·78	8·83	17·41	...	78.61*	3·55	,,	8th	133
Moule-à-Chique Estate	3·15	1·15	1·06	1·81	2·56	5·50	5·77	9·78	8·55	7·82	11·84	0·90	59·89	3·50	,,	7th	138
Beausejour Estate ...	4·55	3·90	...	...	...	6·05	6·43	10·19	12·47	7·56	14·16	...	65·31*	3·42	,,	8th	106
Pointe Sable ,, ...	5·21	3·02	1·30	2·82	2·69	5·28	7·78	10·51	12·54	6·85	13·70	2·52	74·22	3·65	,,	7th	159
Micoud, Troumassée Est.	5·99	3.26	2·00	3·36	5·91	5·62	9 61	9·92	8·68	7·68	12·76	1·76	76·55	4·00	,,	6th	99
Dennery, Mamiku Estate	6·27	3·15	1 83	2·69	4·62	6·65	5·34	9·31	8·45	7·94	14·24	1·87	72·36	3·68	,,	7th	273
Prospect ,, ...	8·09	4·45	2·57	2·45	8·31	7·86	10·37	12·94	14·26	16·71	25·85	4·05	115·91	8·43	Nov.	7th	290
Border ,, ...	7·38	3·56	2·90	2·34	9·37	11·30	11·11	13·31	17·01	15·61	24·63	4·13	122·65	8·30	Nov.	7th	261

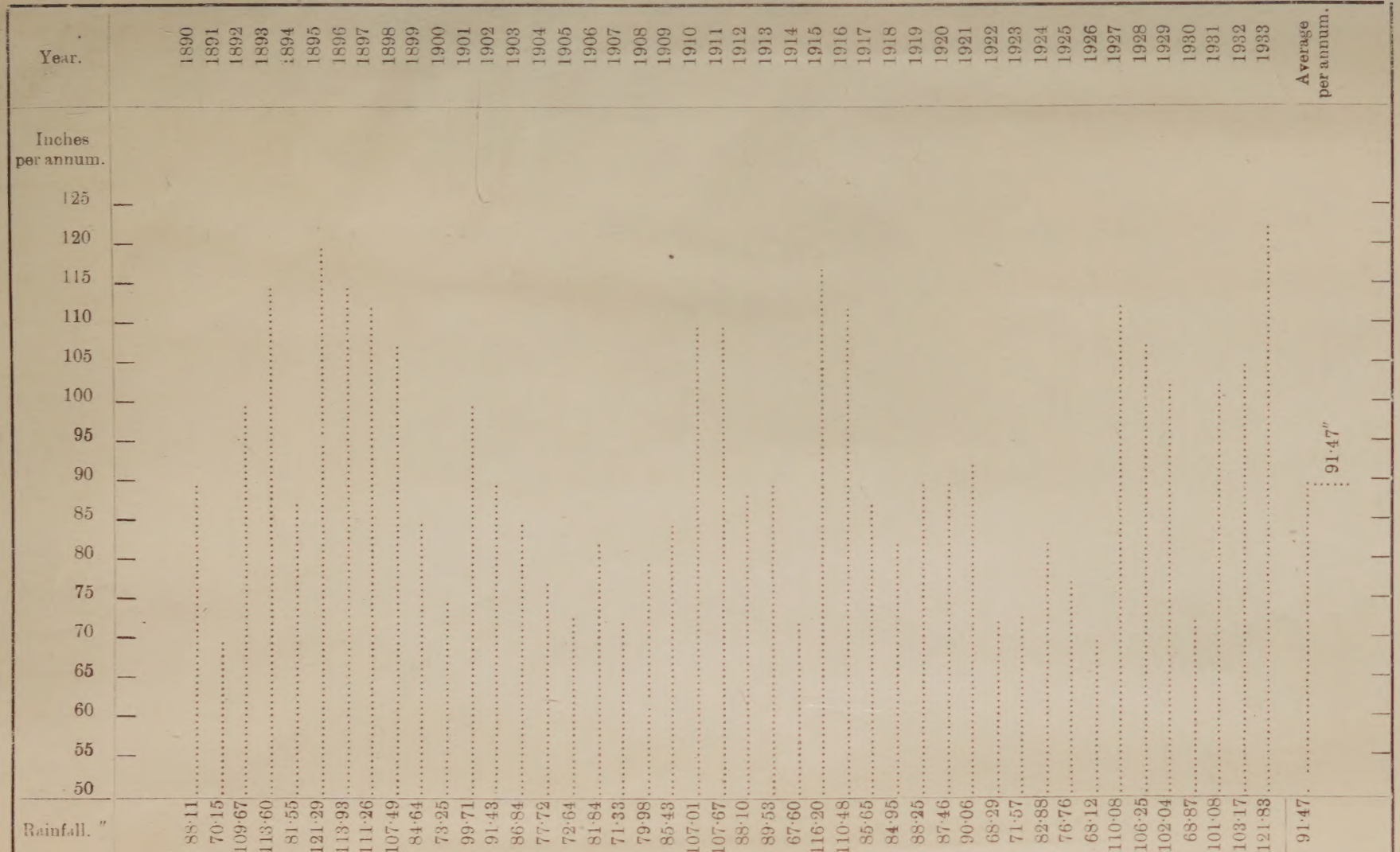
* Record not complete.

	Crown Lands	Crown Lands	Beausejour Sout.
Maxima=	188·70	8·50—Nov. 7th.	305

E. A. WALTERS, *Agricultural Superintendent.*

APPENDIX V.

GRAPH of RAINFALL of the BOTANIC GARDENS, Castries during the period 1890—1933.



REVISED PRICES OF NURSERY PLANTS, ETC.

The prices of plants do not include the cost of the box or baskets, for which a charge will be made, if not returned to the Department.

All prices specified are for plants of standard quality. The prices of plants not included in this list will be fixed by the Agricultural Superintendent.

When nutmegs are supplied by the owner for grafting, a charge of 3d. will be made for each plant on delivery.

An addition of 100% is made on the price of all plants supplied for export from the Colony

No plants are supplied on Public Holidays.

At least six months previous notice must be given when large quantities of such plants as coffee, cacao, nutmegs, citrus, cane plants, etc., are required, as it is not feasible to keep large supplies of these on hand. At least six months notice is required for large supplies of budded citrus, the sour stock for which have to be specially propagated.

Complaints as to the quality or quantity of plants, etc., supplies, or as to the prices charged, should be made in writing to the Agricultural Superintendent.

PLANTS.

Oranges Budded	3d. per plant.
Oranges Sour	6d. per hundred.
Grapefruit Budded	3d. per plant.
Lime Plants (Seedlings)	1/- per hundred.
Lime Plants Budded/Grafted	2d. to 4d. per plant.
Mangoes Budded/Grafted	6d. to 1/- per plant.
Coffee Plants	1/- to 2/- per hundred.
Cacao Budded	2d. per plant.
Nutmegs Grafted	6d. to 9d. per plant.
Avocado Pears	2d. to 3d. per plant.
Avocado Grafted	2d. to 3d. per plant.
Cane Plants	1/- per hundred.
Pineapple Plants	1d. to 3d. per plant.
Guava Plants	1d. per plant.
Eucalyptus	2/- per hundred.
Casuarina	2/- per hundred.
Palms (various)	3d. per plant.
Ornamental Plants (various)	2d. to 1/- per plant.
Seeds (various)	2d. to 6d. per packet.
Seeds (vegetable)	2d. to 3d. per packet.
Plants for windbreaks, hedges, etc., other than the above mentioned	2/- per hundred.
Grass and Fodder Plants	1/- to 2/- per hundred.
Cover Crops and Green Manures	1d. per lb.

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